1278852

-FINAL-

Data Summary Report:
2010 Residential Activity-Based Sampling
Libby Asbestos Superfund Site, Operable Unit 4
Libby, Montana

February 2014

Contract No. W9128F-11-D-0023
Task Order No. 0002

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region 8

Prepared by:

CDM Federal Programs Corporation
555 17th Street, Suite 1100
Denver, Colorado 80202

This page intentionally left blank to facilitate double-sided printing.

Data Summary Report:
2010 Residential Activity-Based Sampling
Libby Asbestos Superfund Site, Operable Unit 4, Libby, Montana

Approvals:

Liz Fagen

Elizabeth Fagen
U.S. EPA, Region VIII, Libby Remedial Project Manager

Date: 3/13/14

This page intentionally left blank to facilitate double-sided printing.

Table of Contents

List of Figures

List of Tables

List of Appendices and Attachments

List of Acronyms and Abbreviations

%	percent
µm	micrometers
ABS	activity-based sampling
Ago	grid opening area
bgs	below ground surface
C_{air}	concentration of LA in air
CB&I	CB&I Federal Services, LLC
cc	cubic centimeter
cc^{-1}	per cubic centimeter
CDM Smith	CDM Federal Programs Corporation
CH	chrysotile
CHISQ	Chi-square
COC	chain of custody
DQO	data quality objective
EDD	electronic deliverable document
EDS	energy dispersive spectroscopy
EFA	effective filter area
EPA	U.S. Environmental Protection Agency
ESAT	Environmental Services Assistance Team
F	fraction of primary filter deposited on secondary filter
FBAS	fluidized bed asbestos segregator
FSDS	field sample data sheet
GOx	grid openings counted
GPS	global positioning system
HHRA	human health risk assessment
HV	high volume
ID	identification
ISO	International Organization for Standardization
IUR	inhalation unit risk
L	liter
LA	Libby amphibole
LV	low volume
MCE	mixed cellulose ester
min	minute
mm	millimeter
mm^2	square millimeters
mph	miles per hour
N	number of asbestos structures counted
ND	non-detect
NFG	National Functional Guidelines
NAM	non-asbestos material

List of Acronyms and Abbreviations, continued

NVLAP	National Voluntary Laboratory Accreditation Program
OA	other amphibole-type asbestos
OU	Operable Unit
PCME	phase contrast microscopy-equivalent
PLM	polarized light microscopy
PLM-VE	polarized light microscopy visual area estimation
PLM-Grav	polarized light microscopy gravimetric
QA	quality assurance
QATS	Quality Assurance Technical Support
QC	quality control
RfC	reference concentration
ROM	record of modification
S	analytical sensitivity
s/cc	structures per cubic centimeter of air
SAP	sampling and analysis plan
SAED	selected area electron diffraction
Shaw E&I	Shaw Environmental & Infrastructure Group
Site	Libby Asbestos Superfund Site
SPF	sample preparation facility
SOP	standard operating procedure
TAS	target analytical sensitivity
TEM	transmission electron microscopy
V	volume
VV	visible vermiculite
VV +	with visible vermiculite
VV -	without visible vermiculite
VWC	volumetric water content

This page intentionally left blank to facilitate double-sided printing.

1 INTRODUCTION

1.1 Site Background

Libby is a community in northwestern Montana located 7 miles southwest of a vermiculite mine that operated from the 1920s until 1990. The mine began limited operations in the 1920s and was operated on a larger scale by the W.R. Grace and Company from approximately 1963 to 1990. Studies revealed that the vermiculite from the mine contains amphibole-type asbestos, referred to as Libby amphibole (LA).

Epidemiological studies revealed that workers at the mine had an increased risk of developing asbestos-related lung disease (McDonald *et al.* 1986, 2004; Amandus and Wheeler 1987; Amandus *et al.* 1987; Whitehouse 2004; Sullivan 2007). Additionally, radiographic abnormalities were observed in 17.8 percent (%) of the general population of Libby including former workers, family members of workers, and individuals with no specific pathway of exposure (Peipins *et al.* 2003; Whitehouse *et al.* 2008; Antao *et al.* 2012; Larson *et al.* 2010, 2012a, 2012b). Although the mine has ceased operations, historic or continuing releases of LA from mine-related materials could be serving as a source of ongoing exposure and risk to current and future residents and workers in the area. The Libby Asbestos Superfund Site (Site) was listed on the U.S. Environmental Protection Agency (EPA) National Priorities List in October 2002.

1.2 Document Purpose

As determined by previous investigations conducted at the Site, LA is present in multiple environmental media in Libby. However, asbestos fibers in source materials are typically not inherently hazardous, unless the asbestos is released from the source material into air where it can be inhaled (EPA 2008). If inhaled, asbestos fibers can increase the risk of developing lung cancer, mesothelioma, pleural fibrosis, and asbestosis. Thus, the evaluation of risks to humans from exposure to asbestos is most reliably achieved by the collection of data on the level of asbestos in breathing zone air during disturbance of asbestos source materials, referred to as "activity-based sampling" (ABS) (EPA 2008).

In 2010, the EPA conducted several outdoor ABS investigations in Operable Unit 4 (OU4), which encompasses the residential/commercial properties in Libby, to evaluate potential exposures during realistic and representative activities from the disturbance of soils in OU4. These outdoor ABS investigations consisted of five different sampling scenarios. The specific objectives and study designs of each sampling scenario are described in the governing sampling and analysis plan (SAP), *Sampling and Analysis Plan, Supplemental Activity-Based Sampling* (EPA 2010a). The five sampling scenarios were:

- Scenario 1: Working in Residential Yards. This scenario was developed to evaluate disturbances of residential yard soil through raking, mowing, and digging activities.

- Scenario 2: Working in Residential Gardens. This scenario was developed to evaluate digging disturbances of residential garden soil.

- Scenario 3: Child Playing on Unpaved Driveway. This scenario was developed to evaluate disturbances that may reasonably occur on a gravel or dirt driveway, such as children riding bicycles, playing with toys, playing basketball, etc.

- Scenario 4: Driving on Roads in Libby. This scenario was developed to evaluate exposures from driving in a car on roads and alleys in Libby.

- Scenario 5: Riding Bicycles in Libby. This scenario was developed to evaluate exposures from riding bicycles on roads and trails in Libby.

These five sampling scenarios were conducted from July through September 2010 and the resulting samples were analyzed from July 2010 through January 2011. A supplemental analysis was performed in 2013 for a subset of these samples to improve the achieved analytical sensitivity (CDM Smith 2012a,b); see Section 3.1.3 for additional information on this supplemental analysis.

This document summarizes the results of the 2010 investigation, including the supplemental analyses conducted during 2013, and provides an interpretation of the collected data. *[Note: The evaluation of potential risks is beyond the scope of this document. Human health risks from exposures to LA are evaluated in the Site-wide human health risk assessment.]*

1.3 Document Organization

Following this introduction, this report is organized into the following sections:

Section 2 This section summarizes data management procedures, including sample collection, documentation, handling, custody, and data management.

Section 3 This section summarizes the analytical methods used for estimating the level of LA in air and soil, and the data reduction methods utilized in this report.

Section 4 This section summarizes the data that were collected for Scenario 1 and includes an overview of the study design, presents the analytical results, and provides an interpretation of the collected data.

Section 5 This section summarizes the data that were collected for Scenario 2 and includes an overview of the study design, presents the analytical results, and provides an interpretation of the collected data.

Section 6 This section summarizes the data that were collected for Scenario 3 and includes an overview of the study design, presents the analytical results, and provides an interpretation of the collected data.

Section 7 This section summarizes the data that were collected for Scenario 4 and includes an overview of the study design, presents the analytical results, and provides an interpretation of the collected data.

Section 8 This section summarizes the data that were collected for Scenario 5 and includes an overview of the study design, presents the analytical results, and provides an interpretation of the collected data.

Section 9 This section presents the results of the data quality assessment, including a summary of program audits, modifications, data verification efforts, an evaluation of quality control samples, and a data adequacy assessment.

Section 10 This section provides full citations for all analytical methods, site-related documents, and scientific publications referenced in this document.

All referenced tables and figures are provided at the end of this document. All referenced appendices are provided electronically upon request. A detailed summary of all sample information and analytical results for all samples presented in this document is provided in **Attachment 1**.

This page intentionally left blank to facilitate double-sided printing.

2 DATA MANAGEMENT

2.1 Sample Collection, Documentation, Handling, and Custody

All samples generated as part of the ABS investigations were collected, documented, and handled in basic accordance with Libby-specific standard operating procedures (SOPs), as specified in the governing SAP (EPA 2010a).

2.1.1 Collection Methods

ABS Air

All ABS activities were performed by an EPA field contractor (CDM Federal Programs Corporation [CDM Smith]) in accordance with the ABS scenario scripts provided in the SAP. Personal ABS air samples were collected in accordance with SOP EPA-LIBBY-01. In brief, the ABS actor carried a battery-powered sampling pump in a backpack, with an air monitoring cassette attached to the pump *via* a plastic tube. The cassette was affixed to the actor such that it was located within the breathing zone. All air samples were collected using cassettes containing a 25-millimeter (mm) diameter mixed cellulose ester (MCE) filter with a pore size of 0.8-micrometers (µm).

For all scenarios, the ABS actor wore two different types of sampling pumps. The primary air sample was collected using a sampling pump operating at a high flow rate (approximately 4 liters per minute [L/min]); this sample and is referred to as the "high volume" (HV) sample. A backup air sample was collected using a sampling pump operating at a low flow rate (approximately 2 L/min); this sample is referred to as the "low volume" (LV) sample. The HV and LV samples are filter replicates (i.e., each filter represents the same sample collection duration, but different total sample air volumes). The LV sample was analyzed in cases where the HV sample was damaged or overloaded (see Section 3.1.1 for additional information on filter preparation).

At the start of each sampling day, each air sampling pump was calibrated using a rotameter that had been calibrated to the primary calibration standard (i.e., a Bios DryCal® DC-Lite). During the ABS activities, pump flow rates were verified every 30 minutes and re-calibrated as appropriate.

Soil

Surface soil composite samples were collected and homogenized in accordance with SOP CDM-LIBBY-05. At the time of collection, each soil sub-sampling point was inspected for visible vermiculite (VV) and a qualitative estimate of VV was determined – none, low, moderate, or high – in basic accordance with the SOP CDM-LIBBY-06. A count of the number of sampling

points assigned to each VV ranking was recorded in the hard copy field logbooks (e.g., 18 none [X], 6 low [L], 4 moderate [M], 2 high [H]).

Soil Moisture Content

In situ soil moisture was measured before each sampling event using a soil moisture meter. For each ABS area, soil moisture was collected from a minimum of 10 locations between 0 and 3 inches below ground surface and the volumetric water content (VWC) was determined. ABS activities were not performed if the average VWC was greater than 30%, or if the VWC of any of the measurement points was greater than 50%.

Meteorological Data

Data from the National Oceanic Atmospheric Administration stations in Libby (LBBM8), at the mine (ZONM8), and in Troy (TROM8) were downloaded electronically from the MesoWest website[1] to provide information on meteorological conditions during the ABS timeframe.

2.1.2 Documentation, Handling, and Custody Methods

All ABS air and soil samples collected were identified with sample identification (ID) numbers that included a program-specific prefix of "EX-1" (e.g., EX-10001). Sample-specific information, such as the sample type, location, collection method, and collection date, was recorded in a hard copy field logbook[2] maintained by the field sampling team. This information was also captured electronically using a hand-held "mobile surveyor" device. All samples collected in the field were maintained under chain of custody (COC) during sample handling, preparation, shipment, and analysis.

2.2 Analytical Results Recording

Standardized data entry spreadsheets (electronic data deliverables, or EDDs) have been developed specifically for the Libby project to ensure consistency between laboratories in the presentation and submittal of analytical data. In general, a unique EDD has been developed for each analytical method and each medium. Each EDD provides the analyst with a standardized laboratory bench sheet and accompanying data entry form for recording analytical data. The data entry forms contain a variety of built-in quality control (QC) functions that improve the accuracy of data entry and help maintain data integrity. These spreadsheets also perform automatic computations of analytical input parameters and results (e.g., sensitivity, dilution factors, and concentration), thus reducing the likelihood of analyst calculation errors. The EDDs generated by the laboratories are uploaded directly into the Libby site database (see Section 2.4).

[1] http://mesowest.utah.edu/

[2] For the purposes of this investigation, field sample data sheet (FSDS) forms were not utilized.

2.3 Hard Copy Data Management

Hard copies of all field logbooks and COC forms generated during this investigation are stored in the CDM Smith field office in Libby, Montana. **Appendix A** of this report provides copies of the field documentation for this investigation.

All analytical bench sheets are scanned and included in the analytical laboratory job reports. These analytical reports are submitted to the Libby laboratory coordinator (i.e., EPA's Environmental Services Assistance Team [ESAT] contractor, TechLaw) and stored electronically. **Appendix B** of this report provides copies of all the analytical laboratory reports for analyses performed as part of this investigation.

2.4 Electronic Data Management

Detailed information regarding electronic data management procedures and requirements can be found in the *EPA Data Management Plan for the Libby Asbestos Superfund Site* (EPA 2012). In brief, sample and analytical electronic data are stored and maintained in the Libby Scribe project databases that are housed on a local computer located at the TechLaw office in Golden, Colorado, which is backed up daily to an external hard drive. Raw data summarized in this report were downloaded from Scribe.NET on 1/20/2014, into a Microsoft Access® database by CDM Smith. A frozen copy of this Access database is provided in **Appendix C** of this report.

Because data for the Libby project are maintained in multiple Scribe projects (e.g., analytical data are managed in annual projects, field information is managed in a project separate from the analytical information), the data have been combined into one Access database reflecting a compilation of tables from multiple Scribe projects. Any changes made to these Scribe projects since this download will not be reflected in the Access database.

2.5 Personal Data Security

To ensure the personal data security of the home and business owners whose properties were sampled through the course of this study, information on residential/commercial property addresses is "masked" in this data summary report. Actual street addresses (e.g., 123 Main Street) are not shown; instead, properties have been assigned unique property identification numbers (e.g., AD-000123) and these identifiers are used to reference specific properties. Cross-referencing the property identification numbers to the actual street addresses is only possible through use of the Scribe project databases described in Section 2.4. These databases are only available to Scribe subscribers upon approval by EPA.

3 SAMPLE PREPARATION AND ANALYSIS METHODS

3.1 LA in Air

3.1.1 ABS Sample Analysis Hierarchy

As noted previously, for most scenarios, each sampling event resulted in two ABS air samples for each actor – one HV sample and one LV sample. These samples are field replicates in that they were collected over the same sampling duration, but using different sampling pump flow rates (resulting in different total air sample volumes). The HV sample was analyzed in preference to the LV sample. If the HV sample was deemed to be overloaded (i.e., more than 25% particulate loading on the filter), the LV sample was analyzed in preference to performing an indirect preparation on the HV sample. If the LV sample was also deemed to be overloaded, an indirect preparation (with ashing) of the HV sample was performed in accordance with SOP EPA-LIBBY-08.

3.1.2 Original Analysis

Analysis Method and Counting Rules

Air filters collected as part of this effort were prepared and analyzed for asbestos using transmission electron microscopy (TEM) in basic accordance with International Organization for Standardization (ISO) 10312:1995(E) (ISO 1995), with all applicable Libby-specific laboratory modifications[3], including LB-000019, LB-000028, LB-000029, LB-000030, LB-000031, LB-000053, LB-000066, LB-000084, and LB-000085.

When a sample is analyzed by TEM, the analyst records the size (length, width) and mineral type of each individual asbestos structure that is observed. Mineral type is determined by selected area electron diffraction (SAED) and energy dispersive spectroscopy (EDS), and each structure is assigned to one of the following four categories:

LA Libby-class amphibole. Structures having an amphibole SAED pattern and an elemental composition similar to the range of fiber types observed in ores from the Libby mine (Meeker *et al.* 2003). This is a solid solution series of minerals including winchite and richterite, with lower amounts of tremolite, magnesio-arfvedsonite, magnesio-riebeckite, and edenite/ferro-edenite. Depending on the valence state of iron, some minerals may also be classified as actinolite.

OA Other amphibole-type asbestos fibers. Structures having an amphibole SAED pattern and an elemental composition that is not similar to fiber types from the Libby

[3] Copies of all Libby laboratory modifications are maintained on the Libby Lab eRoom.

mine. Examples include crocidolite, amosite, and anthophyllite. There is presently no evidence that these fibers are associated with the Libby mine.

CH Chrysotile fibers. Structures having a serpentine SAED pattern and an elemental composition characteristic of chrysotile. There is presently no evidence that these fibers are associated with the Libby mine.

NAM Non-asbestos material. These may include non-asbestos mineral fibers such as gypsum, glass, or clay, and may also include various types of organic and synthetic fibers derived from carpets, hair, etc. *Recording of NAM structures is not required.*

In addition, in accordance with Libby-specific laboratory modification LB-000066, information on the sodium and potassium content and mineral identification (e.g., winchite, tremolite), as determined by EDS, of each amphibole asbestos structure observed was also recorded.

Grids were examined at a magnification of 20,000x, and all asbestos structures (including not only LA but OA and CH types as well) that had appropriate SAED patterns and EDS spectra, and with a length ≥ 0.5 µm and an aspect ratio (length:width) ≥ 3:1 were recorded on the Libby-specific TEM laboratory bench sheets and EDD spreadsheets.

Stopping Rules

The TEM stopping rules for all ABS air field samples were as follows:

- Examine a minimum of two grid openings from each of two grids.
- Continue examining grid openings until one of the following was achieved:
  - The target analytical sensitivity (TAS) was achieved (see **Table 3-1** for the scenario-specific TAS).
  - 25 total LA structures were observed.
  - A total filter area of 1.0 square millimeters (mm^2) was examined (approximately 100 grid openings).

For lot blanks and field blanks, the TEM analysis included an examination of a total filter area of 0.1 mm^2 (approximately 10 grid openings).

3.1.3 2013 Supplemental Analysis

Prior to 2011, ABS studies were designed to meet analytical requirements based on the inhalation unit risk (IUR) for asbestos provided in EPA (2008). In 2011, the EPA proposed new cancer and non-cancer toxicity values that are specific to LA (EPA 2011a). These are draft values that are currently undergoing review. The analytical requirements needed to support risk calculations based on the draft LA-specific non-cancer reference concentration (RfC) are lower than those originally specified in earlier (pre-2011) ABS studies.

Therefore, in 2012, EPA determined that supplemental analysis of the 2010 ABS air samples was necessary to achieve lower analytical sensitivities to support reliable risk management decision-making for the human health risk assessment (HHRA) (CDM Smith 2012a,b). The supplemental analysis conducted in 2013 did not require field collection of new samples; instead, the filters collected in 2010 were taken from storage and a supplemental analysis was performed (i.e., additional grid openings were examined) to achieve a revised TAS that was lower than originally achieved.

Analysis Method and Counting Rules

Because of the high number of grid openings needed to achieve the revised TAS, the supplemental analysis of ABS samples utilized counting protocols for recording phase contrast microscopy-equivalent (PCME) structures only (per ISO 10312 Annex E). That is, grids were examined at a lower magnification (~5,000x), and all asbestos structures (including not only LA but OA and CH types as well) that had appropriate SAED patterns and energy dispersive x-ray analysis (EDXA) spectra, and with a length > 5 µm, width ≥ 0.25 µm, and aspect ratio ≥ 3:1 were recorded on the Libby-specific TEM laboratory bench sheets and EDD spreadsheets.

Stopping Rules

The TEM stopping rules for all supplemental ABS air analyses were as follows:

- Examine a minimum of two grid openings from each of two grids.
- Continue examining grid openings until one of the following was achieved:
  - The revised TAS was achieved (see **Table 3-1** for the scenario-specific revised TAS).
  - 25 PCME LA structures were observed.
  - A total filter area of 10 mm^2 was examined (approximately 1,000 grid openings).

3.1.4 Calculation of Air Concentration

The concentration of asbestos in air is given by:

$$C_{air} = N \cdot S$$

where:

C_{air} = Air concentration, expressed as structures per cubic centimeter of air (s/cc)
N = Number of asbestos structures observed
S = Analytical sensitivity (cc^{-1})

For air, the analytical sensitivity is calculated as:

$$S = EFA / (GOx \cdot Ago \cdot V \cdot 1000 \cdot F)$$

where:

S = Analytical sensitivity (cc^{-1})
EFA = Effective area of the filter (mm^2)
GOx = Number of grid openings examined
Ago = Area of a grid opening (mm^2)
V = Volume of air passed through the filter (L)
1000 = Conversion factor (cc/L)
F = Fraction of primary filter deposited on secondary filter (indirect preparation only)

Note that air samples with a count of zero (and hence a concentration of zero) are reported as zero. When computing the best estimate of the mean, samples with a count of zero are evaluated as zero, not at ½ the analytical sensitivity (EPA 2008). This approach yields an unbiased estimate of the true mean that does not depend on the analytical sensitivity of the samples included in the data set.

3.1.5 Calculation of Pooled Air Concentration

In the event that a single air sample has been analyzed more than one time (e.g., by initially examining 100 grid openings and subsequently examining 500 additional grid openings in order to improve the analytical sensitivity), assuming that the same analytical method (i.e., counting rules) was used in both analyses, the results can be combined by "pooling" the total number of structures observed and the total volume of air examined (which is computed as the inverse of the achieved analytical sensitivity), as follows:

$$C_{air,\ pooled} = \sum N / \sum (1/S)$$

where:

$C_{air,\ pooled}$ = Pooled air concentration (s/cc)
$\sum N$ = Total number of asbestos structures observed (summed across analyses)
$\sum (1/S)$ = Total volume of air examined (summed across analyses) (cc), where S is the achieved analytical sensitivity (cc^{-1})

Because the supplemental analyses that were performed for the ABS air samples from this study utilized low magnification (i.e., counting only structures that met PCME counting rules) the pooled air concentration can only be calculated for PCME.

3.2 LA in Soil

3.2.1 Sample Preparation

All soil samples collected for asbestos analysis were transmitted to the Sample Preparation Facility (SPF) located in Troy, Montana. Samples were prepared in accordance with Libby-specific SOP ISSI-LIBBY-01. In brief, the sample was dried and then split into three approximately equal portions: 1) an archive aliquot; 2) a polarized light microscopy (PLM) aliquot; 3) a fluidized bed asbestos segregator (FBAS) aliquot. The archive aliquot was placed into archive at the Troy SPF. The PLM aliquot was sieved into coarse (> ¼ inch) and fine fractions. The fine fraction was ground to reduce particles to a diameter of 250 µm or less and this fine-ground portion was split into four equal aliquots. The FBAS aliquot was archived for possible future analysis (based on a review of the results of the soil PLM and ABS air results).

3.2.2 PLM Analysis Method

Each PLM aliquot was analyzed for LA in accordance with the Libby-specific SOPs for PLM analysis. The coarse fraction (if any) was examined using stereomicroscopy, and any particles of asbestos were removed and weighed in accordance with SOP SRC-LIBBY-01, referred to as PLM gravimetric (PLM-Grav). One of the fine ground fraction aliquots was analyzed by PLM using the visual area estimation method in accordance with SOP SRC-LIBBY-03, referred to as "PLM-VE". The remaining fine ground aliquots were archived at the Troy SPF.

PLM-Grav examines the coarse soil fraction for evidence of asbestos mineral content using stereomicroscopy with confirmation of asbestos by PLM. Of the 269 soil field samples collected during the 2010 ABS investigations, only 60 samples had a coarse fraction. In most cases, the PLM-Grav results were non-detect; only seven samples reported trace levels of LA in the coarse fraction and detected levels of LA were reported in the corresponding fine ground fraction for all seven samples. Therefore, this report focuses on the PLM-VE results for the fine ground fraction only.

PLM-VE is a semi-quantitative method that utilizes Libby-specific LA reference materials to allow assignment of fine ground samples into one of four "bins", as follows:

- Bin A (ND): non-detect
- Bin B1 (Trace): detected at levels lower than the 0.2% LA reference material
- Bin B2 (< 1%): detected at levels lower than the 1% LA reference material but greater than or equal the 0.2% LA reference material
- Bin C (≥ 1%): LA detected at levels greater than or equal to the 1% LA reference material, a quantitative estimate of the concentration is reported

4 SCENARIO 1: WORKING IN RESIDENTIAL YARDS

4.1 Study Design

In the 2010 residential yard investigation, the Scenario 1 ABS investigation included each of three yard disturbance activities – mowing the lawn with a power mower, raking the lawn with a metal-tined rake, and digging a hole using a long shovel (e.g., to simulate sprinkler maintenance). Properties selected for evaluation in Scenario 1 were stratified into each of four different property categories, depending upon the outdoor soil removal status and soil conditions:

- Category 1 - no soil removal required, with PLM-VE Bin B1 in yard
- Category 2 - soil removal complete; no VV
- Category 3 - soil removal complete; VV present
- Category 4 - soil removal still required, with PLM-VE Bin B2 or Bin C in yard

These four categories were selected to be representative of the range of soil conditions that may be present in yards at residential properties in Libby based on the current soil removal triggers (EPA 2003).

Initially, the field identified several candidate properties for possible evaluation in the Scenario 1 ABS study. For each candidate Category 1 and Category 4 residential property, a 30-point composite soil sample was collected from the yard as part of a "pre-screening" effort and analyzed by PLM-VE. **Table 4-1** summarizes the LA soil concentrations and soil VV ranking for the pre-screening soils. As documented in field modification form LFO-000154 (see Section 9.2), the results from the pre-screening effort differed from the historical soil sample PLM results (e.g., Phase I, Contaminant Screening Study). Therefore, the results for soil samples collected as part of the pre-screening were not used to classify residential properties into ABS categories; rather, the classification was based on historical soil sample results.

Ten residential properties were selected for evaluation for each of the four property categories. Three sampling events were conducted at each property in the summer of 2010, with events spaced about one to four weeks apart. Event 1 occurred in July 2010, Event 2 occurred in August 2010, and Event 3 occurred in September 2010.

During each sampling event, a single ABS air sample was collected at each property, representing a composite across all three soil disturbance scenarios (mowing, raking, and digging). Each disturbance scenario was performed for about 20 minutes (i.e., the ABS air sample had a total sampling duration of 60 minutes). The mowing and raking ABS disturbance activities were performed on a yard-wide basis, to reduce the amount of localized stress in one area. The digging scenario was representative of an adult performing sprinkler maintenance activities (i.e., digging in the soil with a long shovel and a trowel) at two locations. The actor

utilized a long-handled shovel to remove soil from a 1-foot by 1-foot square area for about 5 minutes. The soil was temporarily staged on a tarp adjacent to the digging site. The actor then knelt down and continued digging with a trowel for an additional 5 minutes. The depth attained in each digging location was documented in the field logbook. **Figure 4-1** provides example photographs of the Scenario 1 ABS activities.

During each sampling event, one surficial 30-point composite soil sample was collected to be representative of the entire ABS area. The sampling points within the 30-point composite included the two sub-locations selected for digging. All soil samples were analyzed by PLM (see Section 3.2.2). At the time of collection, each soil sub-sampling point was inspected by the field team and a qualitative estimate of VV was determined – none, low, moderate, or high – in basic accordance with the SOP CDM-LIBBY-06.

All ABS air samples were analyzed by TEM (see Section 3.1.1). In addition, ABS air samples for all Category 4 properties were reanalyzed by TEM as part of the supplemental analysis performed in 2013 to improve the achieved analytical sensitivity (see Section 3.1.2).

4.2 Results and Interpretation

4.2.1 Summary of ABS Air Concentrations

Table 4-2 summarizes the measured ABS PCME LA air concentrations, LA soil concentrations, soil VV ranking, and ABS area conditions for each Scenario 1 event. Detailed analytical results are provided in the project database (see **Appendix C**). As shown, most of the ABS air samples were non-detect (111 of 120 samples). LA was detected in ABS air at one Category 1 property and six Category 4 properties. Detected PCME LA air concentrations generally ranged from 0.001 to 0.004 PCME LA s/cc.

The increased detection frequency for Category 4 properties is due, in part, to the supplemental TEM evaluation. As noted above, all ABS air samples for Category 4 properties were re-analyzed as part the 2013 supplemental TEM analysis effort to improve the achieved analytical sensitivity. In the supplemental analysis, the TAS was lowered from 0.002 cc^{-1} to 0.0005 cc^{-1}. **Table 4-3** shows the original analysis results, supplemental analysis results, and pooled air concentrations for Category 4 properties. As seen, with the improved analytical sensitivity, PCME LA structures were detected in seven samples that were originally reported as non-detect. For the purposes of subsequent data evaluations, the pooled PCME LA air concentration (combined across the original and supplemental analysis) is used for all Category 4 properties.

As shown in **Table 4-3**, for two samples (EX-10454 and EX-10531) evaluated as part of the supplemental TEM analysis effort, the supplemental results were significantly different from the original analysis results. Because of these differences, the original and supplemental analyses for these two samples were rejected as unreliable and subsequently re-analyzed (re-

preparing new grids from the original filter). As documented in Libby laboratory modification LB-000093, the re-analysis results are used in preference for these two samples.

4.2.2 Relation of ABS Air to Soil

One of the potential uses of the data generated during the outdoor ABS study is to determine if the concentration of LA observed in outdoor ABS air can be correlated with (and predicted by) the concentration of LA in the soil being disturbed. Thus, the outdoor ABS air results from this study were grouped based on the measured soil levels to determine if air concentrations differed by soil level (as determined by PLM-VE and VV).

Figure 4-2 (Panel A) presents a scatter plot of the measured PCME LA ABS air concentrations stratified by the reported soil PLM-VE results for LA. In this figure, PLM-VE results are grouped into two categories – non-detect (Bin A) and detect[4] (not Bin A). **Figure 4-2** (Panel B) presents a similar scatter plot, except that measured PCME LA ABS air concentrations are stratified by the VV status. In this figure, VV+ indicates where one or more sampling points contained visible levels of vermiculite and VV– where no VV was noted.

As shown, interpretation of these figures is difficult due to the high frequency of non-detects (only 9 of 120 ABS air samples had detected PCME LA) and the fact that only a subset of the ABS air samples were evaluated as part of the supplemental analysis. Despite these limitations, these comparisons suggest that mean ABS air concentrations were higher for locations where LA was detected in soil than locations that were non-detect. Similarly, mean ABS air concentrations were higher for VV+ locations compared to VV- locations.

4.2.3 ABS Air Concentrations by Property Category

Table 4-4 presents a comparison of mean PCME LA concentrations in ABS air samples for each property category. As shown, PCME LA was not detected in Categories 2 and 3 (i.e., properties where a soil removal was performed); however, none of the ABS air samples for these categories were included as part of the supplemental analysis. PCME LA was detected in one or more ABS air samples for Category 1 properties (where a soil removal was not deemed to be necessary, but Bin B1 levels of LA were noted in the yard) and for Category 4 properties (where a soil removal was deemed necessary but had yet to be performed). The mean ABS air concentration was highest for Category 4 properties; however, this observation may be attributable to the fact that only ABS air samples for Category 4 properties were included in the supplemental analysis.

These results suggest that properties where soil removals have been performed have lower ABS air concentrations than properties where a soil removal is needed (but has not yet been

[4] Because so few detected soils were ranked as Bin B2 or Bin C, all detected soils were grouped, rather than trying to stratify by PLM-VE bin.

performed), but the data are too limited to make any conclusions about differences in exposure levels between different property categories.

4.2.4 Comparison to 2007/2008 Results

Because several properties selected for evaluation in the 2010 ABS study were also evaluated in the 2007/2008 ABS study (EPA 2010b), it is also possible to evaluate the potential differences in measured ABS air concentrations at a given property as a function of sampling program.

Figure 4-3 presents a comparison of the mean[5] PCME LA air concentration for ABS samples collected during the summer of 2007 to the mean PCME LA air concentration ABS samples collected in 2010 (across all three summer sampling events) on a property-specific basis. In this figures, non-detects are shown as open bars and displayed at the mean achieved sensitivity.

These results show that ABS air concentrations measured in the summer of 2007 were higher than those measured in the summer of 2010 for nearly all properties. However, this conclusion is limited by the fact that only two properties had detected ABS air concentrations in both years (both were Category 4 properties that were part of the supplemental evaluation). For these two properties, ABS air concentrations in 2007 were about two orders of magnitude higher than in 2010. If a similar pattern were expected for other properties, the analytical sensitivity achieved in 2010 for Category 1-3 properties was not adequate to make meaningful between-year comparisons.

There are several potential reasons why the 2007 ABS results were higher than the 2010 ABS results, but the single most important factor is likely to be differences in the ABS activity intensity between the ABS programs. In the 2007 ABS program, soil disturbance activities (raking, mowing, digging) were conducted within a subarea of the yard and sampling duration was usually about 2 hours per disturbance scenario (i.e., 2 hours raking, 2 hours mowing, and 2 hours digging). Often, this resulted in the subarea being mowed/raked multiple times over the course of the sampling activity duration. As a result, any existing grass was typically worn and bare patches of soil were often observed at the end of the ABS duration, which may have resulted in elevated asbestos releases during sampling. As described above, the 2010 ABS program reduced the ABS sampling duration for each activity to 20 minutes and activities were performed on a yard-wide basis to reduce the amount of localized stress in one area. These results demonstrate how much influence ABS activity intensity can have on measured ABS air concentrations.

4.2.5 Relative Sensitivity of PLM-VE vs. VV

As discussed above, for every soil sample collected, there are two metrics for reporting estimated LA levels – PLM-VE results (as reported by the analytical laboratory) and VV

[5] Mean across mowing, raking, and digging ABS air samples.

information (as reported by the field sampling teams). In the *2007/2008 ABS Data Summary Report* (EPA 2010b), a comparison of the relative sensitivities of these two metrics suggested that VV inspection may be a somewhat more sensitive method for detecting LA in soil than PLM-VE.

Table 4-5 (Panel A) presents a comparison of PLM-VE results to VV inspection results for all soil samples collected as part of this 2010 ABS program (across all scenarios). In this table, results that are ranked as concordant are shaded in grey. For comparison purposes, Panel B of this table presents a similar comparison showing the PLM-VE and VV inspection results from the 2007/2008 ABS study. As shown, the overall concordance between PLM-VE and VV was about 60%, which is similar to what was observed the 2007/2008 study (66%). However, in 2007/2008, of the 159 samples that were ranked as VV-, only 4 samples (3%) were reported as detect by PLM-VE; but in 2010, about 25% of samples ranked as VV- were reported as detect by PLM-VE. This suggests that the PLM-VE method has improved in the ability to detect LA.

In reviewing the PLM-VE results, it was noted that a different analytical laboratory performed the soil analyses in 2010 (ESAT Region 8 laboratory) than in 2007/2008. Recent inter-laboratory evaluations indicate that the ESAT Region 8 laboratory tends to detect lower levels of LA relative to the other PLM-VE laboratories (Shaw Environmental & Infrastructure Group [Shaw E&I] 2012a-g). Thus, the ability of the PLM-VE method to detect LA is dependent upon which analytical laboratory is performing the PLM-VE analysis.

This page intentionally left blank to facilitate double-sided printing.

5 SCENARIO 2: WORKING IN RESIDENTIAL GARDENS

5.1 Study Design

In the 2010 outdoor residential garden investigation, the Scenario 2 ABS activity was representative of an adult gardening (i.e., digging in the soil with trowel and hands) to disturb the soil to a depth of 12 inches below ground surface (bgs). As specified in the SAP (EPA 2010a), Scenario 2 was to also include a rototilling activity; however, this activity was not conducted (see Section 9.2 for documentation of this field modification). ABS was conducted on a garden-wide basis and sampling duration was about 60 minutes. To reduce the amount of localized stress in one area, the digging was performed in six discrete locations distributed evenly within the garden, with 10 minutes spent at each location. **Figure 5-1** provides example photographs of the Scenario 2 ABS activities.

In Scenario 2, ten residential properties were selected for each of two different categories, based on the current soil removal triggers for gardens (EPA 2003), as follows:

- VV -: No soil removal required in the garden; no VV present in the garden
- VV +: Soil removal is needed in the garden; VV is present in the garden

Many of these properties were the same as the properties selected for the yard or driveway scenarios (see Section 4 and Section 6). Three sampling events were conducted at each property in the summer of 2010, with events spaced 5 to 44 days apart (depending upon the property). In general, Event 1 occurred in July 2010, Event 2 occurred in August 2010, and Event 3 occurred in September 2010.

During each sampling event, a single ABS air sample was collected at each property, representing a composite across digging disturbances at the six locations within each garden. Also, one surficial 30-point composite soil sample was collected to be representative of the entire garden ABS area. The sampling points within the 30-point composite included the six locations selected for digging. All soil samples were analyzed by PLM (see Section 3.2.2). At the time of collection, each soil sub-sampling point was inspected by the field team and a qualitative estimate of VV was determined – none, low, moderate, or high – in basic accordance with the SOP CDM-LIBBY-06.

All ABS air samples were analyzed by TEM (see Section 3.1.1). In addition, ABS air samples for all VV - properties[6] (30 ABS air samples) were reanalyzed by TEM as part of the supplemental analysis to improve the achieved analytical sensitivity (see Section 3.1.2).

[6] For the supplemental analyses, the intention was to reanalyze ABS air samples from VV + properties because the VV + properties are expected to have higher LA air concentrations than the VV - properties. However, due to a clerical error, VV - properties were reanalyzed instead.

5.2 Results and Interpretation

5.2.1 Summary of ABS Air Concentrations

Table 5-1 summarizes the measured ABS PCME LA air concentrations, LA soil concentrations, soil VV ranking, and ABS area conditions for each Scenario 2 event. Detailed analytical results are provided in the project database (see **Appendix C**). As shown, most of the ABS air samples were non-detect (49 of 60 samples). LA was detected in ABS air at three VV - properties and four VV + properties. When LA was detected, air concentrations were typically about 0.001 to 0.004 PCME LA s/cc.

As part of a supplemental TEM analysis effort to improve the achieved analytical sensitivity for ABS air samples for VV - properties, the TAS was lowered from 0.003 cc^{-1} to 0.001 cc^{-1}. **Table 5-2** shows the original analysis results, supplemental analysis results, and pooled air concentrations for VV - properties. As seen, with the improved analytical sensitivity, PCME LA structures were detected in six samples that were originally reported as non-detect. For the purposes of subsequent data evaluations, the pooled PCME LA air concentration (combined across the original and supplemental analysis) is used for all VV - properties.

5.2.2 Relation of ABS Air to Soil

As discussed previously, one of the potential uses of these ABS data is to determine if the concentration of LA observed in outdoor ABS air can be correlated with (and predicted by) the levels of LA in the soil being disturbed. Thus, the outdoor ABS air results from this study were grouped based on the measured soil levels to determine if air concentrations differed by soil level (as determined by PLM-VE and VV).

Figure 5-2 (Panel A) presents a scatter plot of the measured PCME LA ABS air concentrations stratified by the reported soil PLM-VE results for LA. In this figure, PLM-VE results are grouped into two categories – non-detect (Bin A) and detect[7] (not Bin A). **Figure 5-2** (Panel B) presents a similar scatter plot, except that measured PCME LA ABS air concentrations are stratified by the VV status. In this figure, VV+ indicates where one or more sampling points contained visible levels of vermiculite and VV– where no VV was noted.

As shown, these comparisons suggest that ABS air concentrations associated with garden soils where the PLM-VE result is detect for LA are about two times higher than garden soils where no LA is detected. The differences in mean ABS air concentrations as a function of VV status are counter-intuitive, with slightly higher mean concentrations associated with VV- soil conditions. However, interpretation of these figures is difficult due to the high frequency of non-detects (only 10 of 60 ABS air samples had detected PCME LA) and the fact that only the ABS air

[7] Because so few detected soils were ranked as Bin B2 or Bin C, all detected soils were grouped, rather than trying to stratify by PLM-VE bin.

samples from VV – properties were evaluated as part of the supplemental analysis. If ABS air samples from the VV + properties were reanalyzed to achieve a better sensitivity, it is likely that the garden soil to ABS air correlation could be improved.

This page intentionally left blank to facilitate double-sided printing.

6 SCENARIO 3: CHILD PLAYING ON UNPAVED DRIVEWAY

6.1 Study Design

In the 2010 residential driveway investigation, the ABS activity was representative of a child playing on an unpaved driveway and included both digging and biking activities. The child digging activity was conducted with the (adult) actor sitting on the ground while digging or scraping the top 2 to 6 inches of the surface of the driveway, pushing soil/rock to the side, and then replacing it for a period of approximately 5 minutes. This activity was repeated at six discrete locations evenly distributed across the entire driveway. For the child biking activity, the actor rode a small non-motorized vehicle (e.g., bicycle or tricycle) with minimal ground clearance across the driveway in straight lines covering the entire area of the driveway for 30 minutes. Thus, the driveway ABS activity had a total sampling duration of about 60 minutes (i.e., 30 minutes digging and 30 minutes of biking). The air cassette was worn 22 inches above the ground to better represent a child's breathing zone while biking and moved to the actor's right shoulder for the digging portion to simulate a child's breathing zone while seated and digging/playing. **Figure 6-1** provides example photographs of the Scenario 3 ABS activities.

In Scenario 3, ten residential properties were selected for each of two different categories, based on the current soil removal triggers for driveways (EPA 2003), as follows:

- VV -: No soil removal required in the driveway; no VV present in the driveway
- VV +: Soil removal is needed in the driveway; VV is present in the driveway

Many of these properties were the same as the properties selected for the yard or garden scenarios (see Section 4 and Section 5). A total three ABS events were conducted at each property, with each sampling event spaced 5 to 44 days apart (depending upon the property). In general, Event 1 occurred in July 2010, Event 2 occurred in August 2010, and Event 3 occurred in September 2010. For one property (AD-005148), only one sampling event was conducted, as the driveway was paved after the first event.

During each sampling event, a single ABS air sample was collected at each property, representing a composite across both activities (digging and biking). Also, one surficial 30-point composite soil sample was collected to be representative of the entire ABS area. The sampling points within the 30-point composite included the six sub-locations selected for digging. All soil samples were analyzed by PLM (see Section 3.2.2). At the time of collection, each soil sub-sampling point was inspected by the field team and a qualitative estimate of VV was determined – none, low, moderate, or high – in basic accordance with the SOP CDM-LIBBY-06.

All ABS air samples were analyzed by TEM (see Section 3.1.1). Upon review of this dataset, it was determined that no supplemental analysis was necessary for Scenario 3 at that time (CDM Smith 2012b). Whether a supplemental evaluation may be warranted in the future will depend upon the value identified as the final RfC for LA.

6.2 Results and Interpretation

6.2.1 Summary of ABS Air Concentrations

Table 6-1 summarizes the measured ABS PCME LA air concentrations, LA soil concentrations, soil VV ranking, and ABS area conditions for each Scenario 3 event. Detailed analytical results are provided in the project database (see **Appendix C**). As shown, LA was detected in ABS air at one VV - property (Property AD-003052) and two VV + properties (Properties AD-003789 and AD-003775), with detected air concentrations varying widely from about 0.002 to 0.08 PCME LA s/cc. One notable observation is the range in ABS air concentrations for Property AD-003789. At this property, LA was consistently detected in soil from the driveway (with soil concentrations of LA ranging from trace to 1% depending upon the sampling event), yet corresponding ABS air samples ranged from non-detect to 0.08 PCME LA s/cc. These results highlight the inherent variability in measured ABS air concentrations.

6.2.3 Relation of ABS Air to Soil

As discussed previously, one of the potential uses of these ABS data is to determine if the concentration of LA in air can be correlated with (and predicted by) LA levels in soil. Thus, the outdoor ABS air results from this study were grouped based on the measured soil levels to determine if air concentrations differed by soil level (as determined by PLM-VE and VV).

Figure 6-2 (Panel A) presents a scatter plot of the measured PCME LA ABS air concentrations stratified by the reported soil PLM-VE results for LA. In this figure, PLM-VE results are grouped into two categories – non-detect (Bin A) and detect[8] (not Bin A). **Figure 6-2** (Panel B) presents a similar scatter plot, except that measured PCME LA ABS air concentrations are stratified by the VV status. In this figure, VV+ indicates where one or more sampling points contained visible levels of vermiculite and VV– where no VV was noted.

As shown, these comparisons suggest that mean ABS air concentrations associated with driveways soils where the PLM-VE result is detect for LA (not Bin A) or where VV is present tend to be higher than soils that are non-detect (Bin A) or where no VV is observed. However, interpretation of these figures is difficult due to the high frequency of non-detects (only 4 of 60 ABS air samples had detected PCME LA).

[8] Because so few detected soils were ranked as Bin B2 or Bin C, all detected soils were grouped, rather than trying to stratify by PLM-VE bin.

7 SCENARIO 4: DRIVING ON ROADS IN LIBBY

7.1 Study Design

The purpose of Scenario 4 of the 2010 ABS program was to evaluate potential exposures to asbestos while driving on roads in Libby. The driving activity was conducted by an actor driving a full-size automobile (car or truck) for a period of 120 minutes within OU4. Both paved roads and unpaved roads/alleys were traveled during this time interval, with travel evenly distributed throughout OU4. The actor maintained a reasonable speed during the activity, following all posted speed limits. During sample collection, the two front windows of the vehicle were fully open, and the two back windows were open approximately 1 inch. All samples were collected from the right shoulder of the actor. **Figure 7-1** provides example photographs taken during the Scenario 4 ABS activities.

A total of 20 driving events were conducted. It was not be possible to travel every road within the bounded area (see **Figure 7-2**) during each sampling event, so each event covered areas missed in previous events such that the sum of all 20 events comprehensively covered the entire bounded area. The specific driving routes were documented utilizing a portable global positioning system (GPS) unit to record the route. **Figure 7-2** provides a map of the roads that were traveled during the ABS events.

All ABS air samples were analyzed by TEM (see Section 3.1.1). In addition, Scenario 4 ABS air samples were also reanalyzed by TEM as part of the supplemental analysis performed in 2013 to improve the achieved analytical sensitivity (see Section 3.1.2).

No soil samples were collected as part of Scenario 4.

7.2 Results and Interpretation

Table 7-1 shows the original analysis results, supplemental analysis results, and pooled air concentrations for each Scenario 4 sampling event. The number of counted grid openings and the achieved sensitivity are also shown. Detailed analytical results are provided in the project database (see **Appendix C**).

All 20 ABS air samples from this scenario were selected for reanalysis by TEM as part of the supplemental analysis to improve the achieved analytical sensitivity. In this supplemental TEM analysis, the TAS was lowered from 0.001 cc^{-1} to 0.00033 cc^{-1}. However, because the supplemental analysis of the ABS air samples from the first ten sampling events were all non-detect, supplemental analysis of the remaining ten sampling events was halted.

As shown, LA was not detected in any of the ABS samples collected for Scenario 4.

This page intentionally left blank to facilitate double-sided printing.

8 SCENARIO 5: BIKING ON ROADS IN LIBBY

8.1 Study Design

The purpose of Scenario 5 of the 2010 ABS program was to evaluate potential exposures to asbestos while bicycling on roads and trails in Libby. The biking activity was conducted with two actors riding non-motorized, two-wheeled bicycles equipped for use on non-paved roads for a period of 60 minutes. In addition, a bicycle trailer, built to transport a 50-pound child, was affixed to the back of one of the bicycles for the entire event and a personal air monitor was mounted inside the trailer. Two types of ABS air samples were collected as part of this scenario – adult rider samples and trailer samples (to represent potential child exposures).

For each predetermined route of paved and unpaved roads/trails shown on **Figure 8-1**, a pair of two riders, with air samplers mounted to the bicycle and the monitoring cassette affixed in the breathing zone, traveled in single file along the bicycle path. The distance between the riders varied based on visibility, terrain, and safety considerations. Riders alternated positions (lead and trailing) throughout the scenario, with the trailing riders trying to ride in the dust cloud of the rider in front as much as is safe and practical. During these events, the bicycle riders varied their speed between 3 and 15 miles per hour (mph), with a target average speed of 8 mph, adjusted as appropriate to meet path conditions. **Figure 8-2** provides example photographs taken during the Scenario 5 ABS activities.

A total of ten sampling events were conducted in each of three sectors within Libby, resulting in 60 ABS air samples from the adult riders (10 events x 3 sectors x 2 actors) and 30 ABS air samples for the bicycle trailer samples (10 events x 3 sectors x 1 trailer).

All ABS air samples were analyzed by TEM (see Section 3.1.1). In addition, a subset of Scenario 5 ABS air samples (the adult rider samples) were also reanalyzed by TEM as part of the supplemental analysis performed in 2013 to improve the achieved analytical sensitivity (see Section 3.1.2). Upon review of the trailer ABS air sample dataset, it was determined that no supplemental analysis was necessary at that time (CDM Smith 2012a,b). Whether a supplemental evaluation may be warranted in the future will depend upon the value identified as the final RfC for LA.

No soil samples were collected as part of Scenario 5.

8.2 Results and Interpretation

Table 8-1 shows the original analysis results, supplemental analysis results, and pooled air concentrations for the adult rider ABS air samples for each Scenario 5 sampling event. The number of counted grid openings and the achieved sensitivity are also shown. **Table 8-2**

presents the results for the trailer ABS air samples. Detailed analytical results are provided in the project database (see **Appendix C**).

All 60 adult rider ABS air samples from this scenario were selected for reanalysis by TEM as part of the supplemental analysis to improve the achieved analytical sensitivity. In this supplemental TEM analysis, the TAS was lowered from from 0.005 cc^{-1} to 0.0022 cc^{-1}. However, because the supplemental analysis of the ABS air samples from the first five sampling events were all non-detect, supplemental analysis of the remaining five sampling events was halted.

As shown, LA was not detected in any of the ABS samples collected for Scenario 5.

9 DATA QUALITY ASSESSMENT

Data quality assessment is the process of reviewing existing data to establish the quality of the data and to determine how any data quality limitations may influence data interpretation (EPA 2006).

9.1 Field and Laboratory Oversight

9.1.1 Field

Field surveillances consist of periodic observations made to evaluate adherence to investigation-specific governing documents. Field audits are broader in scope than field surveillances and are evaluations conducted by qualified technical or quality assurance (QA) staff that are independent of the activities audited.

A field audit of the 2010 ABS program was conducted on August 31, 2010 (CDM Smith 2010). This audit reviewed ABS activities for Scenario 1 (raking/mowing/digging in yards) and Scenario 2 (digging in gardens) at one property (Property AD-000381), including air and soil sample collection, field change control requirements, sample custody, packing and shipping activities, and equipment decontamination procedures. In addition, a review of field documentation, including field logbook entries, field sketches and photos, and electronic mobile surveyor entries, was performed. No deficiencies were observed the day of the audit. The auditor noted that the sampling team members were very efficient and effective in performing the ABS (CDM Smith 2010).

9.1.2 Laboratory

Laboratory audits are conducted to evaluate laboratory personnel to ensure that samples are handled and analyzed in accordance with the program-specific documents and analytical method requirements (or approved Libby laboratory modification forms) to make certain that analytical results reported are correct and consistent. All aspects of sample handling, preparation, and analysis are evaluated. If any issues are identified, laboratory personnel are notified and retrained as appropriate.

A series of laboratory audits was performed in May-September of 2012 to evaluate all of the Libby laboratories. Detailed audit findings for each laboratory are documented in separate laboratory-specific audit reports (Shaw E&I 2012a-g). No critical deficiencies were noted during the 2012 laboratory audits that would be expected to impact data quality for TEM analyses. However, there were some procedural differences between the laboratories that were noted for PLM.

In particular, while there were slight differences in how the PLM analysts performed the steps of the analysis procedure, it was noted that the ESAT Region 8 laboratory personnel performed a manual grinding of the soil sample using a mortar and pestle prior to analysis by PLM-VE. It is possible that this additional grinding step further reduces heterogeneity in the soil sample and may actually improve the ability of the PLM-VE analysis to detect LA if it were present. It was also noted that ESAT Region 8 laboratory employed a much more vigorous manual agitation of the sample prior to stereomicroscopy examination than the other laboratories. Sample agitation is used to cause asbestos structures to "rise" to the surface of the soil particles to allow for easier observation. These factors may explain why PLM-VE results as measured by ESAT Region 8 laboratory tended to correlate better with measured ABS air concentrations (see Section 4.2.4) than in earlier ABS programs, which did not utilize the ESAT Region 8 laboratory for PLM-VE analyses. For the purposes of this report, since all PLM-VE analyses were performed by ESAT Region 8 laboratory, there are no anticipated negative implications on the PLM-VE analyses associated with the laboratory audit findings.

9.2 Field and Laboratory Modifications

During any large-scale sampling program, such as this ABS investigation, deviations from the original SAP and/or SOPs may occur and it may be necessary to modify procedures as originally specified to optimize sample collection. Any field or laboratory deviations or modifications from the SAP and/or SOPs are recorded on a Libby-specific Record of Modification (ROM) form. The ROM forms are used to document all permanent and temporary changes to procedures contained in guidance documents governing this investigation that have the potential to impact data quality or usability. Any minor deviations (i.e., those that will not impact data quality or usability) are documented in the field logbooks. **Appendix D** contains copies of all field and laboratory ROM forms associated with this investigation.

Three Libby field ROMs (LFO-000154, LFO-000155, LFO-000157) were instituted for this 2010 ABS investigation. **Table 9-1** summarizes the field deviations in each field ROM, and includes an evaluation of the potential data quality implications for each deviation. As shown, with one exception, the deviations identified in the field ROMs were not expected to negatively impact data quality or usability. There was one instance where the collected ABS air sample for one sampling event (EX-10442 from Scenario 1) may be biased high due to sampling of only of a portion of the yard with trace LA levels in soil (as opposed to the entire yard).

One temporary laboratory ROM (LB-000093) was prepared for TEM ABS air analyses conducted in support of this 2010 ABS investigation. This modification was instituted to document the rejection of TEM analyses for two Scenario 1 ABS air samples. In brief, for two samples (EX-10454 and EX-10531) evaluated as part of the supplemental TEM analysis effort, the supplemental results were significantly different from the original analysis results (see **Table 4-3**). Because of these differences, the original and supplemental analyses for these two samples were rejected as unreliable and subsequently re-analyzed (re-preparing new grids from the

original filter). The re-analysis results are used in preference for these two samples (see **Table 4-3**).

9.3 Data Verification and Validation

9.3.1 Data Verification

The Libby laboratory EDDs and Scribe project databases have a number of built-in quality QC checks to identify unexpected or unallowable data values during upload into the database. Any issues identified by these automatic upload checks were resolved by consultation with the field teams and/or analytical laboratory before entry of the data into the database. After entry of the data into the database, several additional data verification steps were taken to ensure the data were recorded and entered correctly.

In order to ensure that the database accurately reflects the original hard copy documentation, all data downloaded from the database were examined to identify data omissions, unexpected values, or apparent inconsistencies. In addition, because these results will be provided to the property owners, 100% of all samples and analytical results for residential properties evaluated in this ABS investigation underwent a detailed verification. For non-residential ABS scenarios (i.e., biking and driving), 10% of the collected samples and analyses were verified. In brief, verification involves comparing the data for a sample in the database to information on the original hard copy field logbooks and on the original hard copy analytical bench sheets for that sample. Any omissions or apparent errors identified during the verification were submitted to the field teams and/or analytical laboratories for resolution in the database and in the hard copy documentation. **Appendix E** presents the detailed findings of the data verification effort for this ABS investigation. These findings are summarized below.

9.3.1.1 Field Documentation Review

As discussed previously in Section 2.1.2, hard copy field sample data sheet (FSDS) forms were not used in this investigation. Instead, field documentation was recorded in a field logbook and entered into a hand-held mobile surveyor device at the time of sample collection. Hard copy field logbooks were reviewed for a total of 277 ABS air and 283 soil samples as part of the data verification effort using a procedure similar to that in Libby-specific SOP EPA-LIBBY-11, *FSDS Data Review and Data Entry Verification*.

Because FSDS forms were not used, data were not recorded in a consistent format, which resulted in several documentation errors and omissions. In general, most of the issues identified were important for the purposes of sample tracking (e.g., air type, personnel ID number, logbook form number), but would not have influenced the quantitative analytical results reported for the sample. However, the recorded air pump information (e.g., start time, stop time) was incorrect for about 7% of ABS air samples, which influenced the calculated total air sample volume, and hence the calculated achieved analytical sensitivity. Additionally, the

media code[9] recorded on the COC was incorrect for about 10% of ABS air samples resulting in the laboratory identifying an incorrect TAS. As a consequence of these field errors, the analytical laboratory had to examine additional grid openings in order to reach the correct TAS for about half of the samples with errors in the air sample volume or media code.

Because of the high frequency of critical errors identified in this verification, the field sampling team reverted back to utilizing FSDS forms to record sample information in subsequent investigations.

9.3.1.2 TEM Documentation Review

A total of 339 TEM analyses[10] for ABS air were reviewed as part of the data verification effort in accordance with Libby-specific SOP EPA-LIBBY-09, *TEM Data Review and Data Entry Verification*. In general, most of the issues identified were non-critical in nature from a data interpretation perspective. The majority of the issues were related to data entry errors in the date received, instrument identifier, analysis date, grid opening name, etc. fields in the EDD. Excluding errors related to issues in the field documentation, critical[11] errors related to the analytical laboratory were noted in about 2% of ABS air analyses.

9.3.1.3 PLM Documentation Review

A total of 283 PLM analyses for soil were reviewed as part of the data verification effort in accordance with Libby-specific SOP EPA-LIBBY-10, *PLM Data Review and Data Entry Verification*. Critical errors were noted in about 3% of soil analyses.

9.3.1.4 Verification Conclusions

All issues identified during the data verification effort were submitted to the field teams and/or analytical laboratories for resolution and rectification. All tables, figures, and appendices (including all hard copy documentation and the database [provided in **Appendix A** and **Appendix B**, respectively]) generated for this report reflect corrected data. Because 100% of the residential dataset (Scenarios 1-3) was verified and all identified issues were resolved, there are no impacts on data quality due to these verification issues. Additionally, 10% of the biking and driving dataset (Scenarios 4 and 5, respectively) was verified; all samples in this dataset were non-detect and no critical errors were noted.

[9] The media code is used by the analytical laboratory to determine the associated analytical requirements for each sample type and links the COC to the Analytical Requirements Summary Sheet.
[10] Includes both original and supplemental TEM analyses.
[11] A critical discrepancy is defined as an issue that could influence the reported sample concentration.

9.3.2 Data Validation

Unlike data verification, where the goal is to identify and correct data reporting errors, the goal of data validation is to evaluate overall data quality and to assign data qualifiers, as appropriate, to alert data users to any potential data quality issues.

Data validation is performed by the EPA Quality Assurance Technical Support (QATS) contractor (CB&I Federal Services, LLC [CB&I]), with support from technical support staff that are familiar with investigation-specific data reporting, analytical methods, and investigation requirements. For the Libby project, data validation of TEM and PLM results is performed in accordance with Libby-specific validation SOPs (QATS-70-094-01, QATS-70-095-01) that were developed based on the draft *National Functional Guidelines (NFG) for Asbestos Data Review* (EPA 2011b).

The EPA QATS contractor prepares an annual summary of the program-wide assessment of quality assurance/quality control (QA/QC). This annual addendum provides detailed information on the validation procedures performed and provides a narrative on the quality assessment for each type of analysis (e.g., TEM, PLM), including the data qualifiers assigned and the reason(s) for these qualifiers to denote when results do not meet acceptance criteria. This annual summary details any deficiencies, required corrective actions, and makes recommendations for changes to the QA/QC program to address any data quality issues.

In 2013, the EPA QATS contractor performed a formal data validation of asbestos results for samples collected and analyzed in 2010 to 2012 across all Site OUs. A detailed summary of this data validation effort is summarized in CB&I (2013). The conclusions of this review are summarized below.

A total of 2,227 field samples (5%) from 263 different laboratory jobs analyzed by five different laboratories between 2010 and 2012 were selected for validation. Samples for validation were selected randomly, choosing samples that were representative across laboratory, analysis method, and media.

Very few asbestos data were qualified for analyses performed from 2010 to 2012. Five field samples and one laboratory QC analysis (repreparation) were qualified due to the failure of the laboratory to perform and/or document daily calibration activities. Two samples were qualified for field blank contamination. No samples from the 2010 ABS program were verified. Although several samples were affected by the lack of a daily calibration, they were not qualified due to the submission and review of other supporting laboratory documentation. The project database (provided in **Appendix C**) includes all assigned data validation qualifiers.

9.4 Field Quality Control

Field-based QC samples are those samples that are collected in the field and submitted to the laboratory in parallel with the field samples. The following sections describe the field QC samples that were collected for air and soil as part of this ABS investigation.

9.4.1 Air

Two types of field QC samples were collected as part of ABS air sampling for this investigation – lot blanks and field blanks.

9.4.1.1 Lot Blanks

A lot blank is a randomly selected filter cassette from a manufactured lot. Lot blanks are collected to ensure air samples for asbestos analysis are collected on asbestos-free filters. Lot blank sampling is performed at a frequency of one lot blank per every 500 cassettes. Only cassette lots where no asbestos is detected in the lot blank are placed into circulation for use in air sample collection, which ensures that the air cassette filters used in this study were free of asbestos fibers prior to sampling activities.

9.4.1.2 Field Blanks

Field blanks are collected to evaluate potential contamination introduced during sample collection, shipping and handling, or analysis. As specified in the SAP (EPA 2010a), field blanks were to be collected at a rate of one per sampling day per property, and 10% of the collected field blanks were to be analyzed each week. A total of 191 field blank samples were collected for asbestos analysis by TEM under this ABS investigation, of these, 38 field blank samples were chosen for analysis (0.130 mm^2 of filter was examined for each field blank). Although the target collection frequency for field blanks was not achieved during seven out of 110 sampling events (i.e., field blanks were not collected from every property on every day when field sampling occurred), no asbestos structures were reported in any of the analyzed field blanks; thus, there are no negative implications as a result of this oversight.

These results demonstrate that asbestos was not introduced into the air samples as a consequence of sample collection, shipping and handling, or analysis.

9.4.2 Soil

Field duplicate samples were collected as part of the soil sampling for this investigation. Field duplicates for soil were collected from the same area as the parent sample but from different individual sampling points. These samples were collected independent of the original field sample with separate sampling equipment and submitted for analysis along with the collected

field samples. The field duplicate contains the same number of subsamples as the parent sample (i.e., the field duplicate sample is also a 30-point composite).

Soil field duplicate samples were collected at a rate of about 1 field duplicate per 20 field samples (5%); a total of 14 field duplicate samples were collected. Field duplicates were sent for analysis by the same method as field samples (PLM) and were blind to the laboratories (i.e., the laboratory could not distinguish between field samples and field duplicates).

Table 9-2 presents an evaluation of the soil field duplicate results; Panel A presents the individual sample results and Panel B presents a concordance evaluation. As shown, 86% of all field duplicate results are concordant. For the two samples where results were discordant, the reported LA levels are within one bin (i.e., Bin A vs. Bin B1). None of the field duplicates had a coarse fraction (i.e., no comparison of PLM-Grav results is needed).

The variability between the field duplicate and the associated parent field sample reflects the combined variation in sample heterogeneity and the variation due to measurement error. Because field duplicate samples are expected to have inherent variability that is random and may be either small or large, there is no quantitative requirement for the agreement of field duplicates. Rather, results are used to determine the magnitude of this variability to evaluate data usability.

9.5 Laboratory Quality Control

Preparation and analytical laboratory QC analyses are evaluated by the EPA QATS contractor on a program-wide basis rather than on a study-specific basis. The rationale for this is that the number of laboratory QC samples directly related to any one study is too limited to draw meaningful conclusions regarding overall data quality. The program-wide QA/QC summary report covering samples collected and analyzed in 2010-2012 (CB&I 2013) contains conclusions for each analytical method and type of laboratory QC analysis. See below for a brief overview of the findings of this report for TEM and PLM analyses performed in 2010 through 2012.

- No LA structures were detected in laboratory blank analyses.
- TEM recount same and recount different analyses ranked as good to acceptable based on program-wide criteria.
- TEM repreparation analyses were all within 90% Poisson confidence interval.
- For TEM, there is generally good concordance for intra-laboratory analyses. However, for inter-laboratory comparisons, there are differences in methods or procedures between analytical laboratories and corrective action may be useful in achieving better agreement and reducing discrepancies due to analytical procedure differences.
- Soil preparation duplicates show that results are not greatly influenced by differences in soil preparation laboratory techniques.
- For PLM-VE, concordance rates rank as acceptable for intra-laboratory analyses. Inter-laboratory analyses suggest that there are differences in methods or procedures between

analytical laboratories (see Section 9.1.2) and corrective action may be useful in achieving better agreement and reducing uncertainties due to analytical procedure differences.

Additionally, there is one issue that has been identified based on the compilation of the preliminary TEM inter-laboratory analyses and review of TEM analyses for other investigations. Between-laboratory differences have been noted on the differentiation of LA structures from NAM structures (e.g., pyroxene) and the determination of sodium and potassium content of LA structures. Preliminary results suggest that the EMSL Analytical laboratory located in Libby, Montana (EMSL27) has a narrower definition of the chemical compositions included in the LA assignment, meaning that this laboratory may record an observed structure as non-countable NAM while another TEM laboratory would rank the same structure as countable LA (TechLaw 2013). Because about 90% of all TEM analyses of ABS air samples performed for this investigation were performed by EMSL27, it is possible that reported air concentrations in this report are biased low.

9.6 Data Adequacy

A comparison of the data collected with the data quality objectives (DQOs) specified in the governing SAP (EPA 2010a) is presented below.

9.6.1 Spatial and Temporal Representativeness

As specified in the DQOs, the spatial bounds of this study were to be restricted to properties located within OU4 of the Libby Asbestos Superfund Site. This OU includes residential and commercial properties in the Libby community. All of the samples collected as part of this study were collected from properties within OU4 (for Scenarios 1-3) or roads/trails in the Libby community (for Scenarios 4-5). Thus, the collected data meet the spatial objectives specified in the governing SAP.

The release of LA from soil into air is expected to depend on several factors that may tend to vary over time, including, for example, the soil moisture content and the amount of ground cover. Therefore, ABS data should, to the extent practicable, be collected over a sufficient time frame to ensure the data are representative of the true long-term mean concentration level. As specified in the DQOs, the exact dates of ABS sampling were not important and selected at random, within the following constraints:

- ABS activities were to be conducted in the summer months (July-September), when conditions for asbestos release most favorable.
- For yard, garden, and driveway scenarios, ABS sampling was not to occur if there was standing water present or if the average VWC was greater than 30% *via* field probe instrumentation.

With exception of the few deviations noted in the field ROMs (see Section 9.2), all samples were collected within the constraints specified above. Thus, it is concluded that, the collected data meet the temporal objectives specified in the governing SAP.

9.6.2 Sample Completeness

The completeness of the dataset is described as a ratio of the amount of data expected from the field program versus the amount of valid data received from the laboratory. Valid data are considered to be those that have not been rejected during the validation process and have been verified at the specified frequency in the SAP (EPA 2010a). Completeness can be expressed by the following equation:

$$\text{Completeness} = \frac{\text{(total number of valid results)}}{\text{(total number of requested results)}} \times 100$$

Based on the data verification (Section 9.3.1) and data validation (Section 9.3.2) findings discussed above, the completeness of each sample set collected as part of this ABS investigation is shown in **Table 9-3**. As shown, the actual number of samples collected and analyses performed met or exceeded the target for all scenarios for both media types (ABS air and soil). Thus, the completeness for the 2010 ABS investigation is 100%.

9.6.3 Confirmation of Analysis Stopping Rules

Air samples analyzed by TEM had specific analytical requirements specified in the SAP (EPA 2010a) and CDM Smith technical memoranda (CDM Smith 2012a, b). The analysis stopping rules for these samples were summarized in Section 3.1.2 and Section 3.1.3. In brief, analysis continued until either the target analytical sensitivity was achieved (see **Table 3-1** for the scenario-specific TAS), the maximum number structures observed was achieved, or the maximum total filter area was reached.

As part of the original TEM analysis effort (i.e., analyses performed in 2010-2011), 328 out of 355 analyses (92%) achieved the TAS. Of the remaining 27 analyses, 20 of the analyses stopped after examining a total filter area of 1.0 mm^2 but before the TAS was achieved, including ten Scenario 1 analyses, seven Scenario 2 analyses, and three Scenario 3 analyses. One analysis stopped after observing 25 LA structures. Six analyses did not achieve any stopping rule. These six samples were selected for supplemental analysis, so the fact that the original analysis did not achieve a stopping rule is not considered a data limitation.

For the 2013 supplemental TEM analysis effort, the pooled achieved sensitivity for 100 of 102 analyses (98%) achieved the TAS (within rounding). For the two remaining analyses, one analysis stopped after observing 25 PCME LA structures and one analysis stopped after examining a total filter area of 10 mm^2 (before the TAS was achieved).

As discussed above, all TEM analyses achieved the specified analytic stopping rules. However, those analyses that stopped based on the maximum filter area stopping rule have higher uncertainty because the achieved analytical sensitivity was higher than the target. Additionally, the achieved analytical sensitivity for samples not included in the supplemental analysis effort may not be adequate for the purposes of supporting risk calculations based on the LA-specific toxicity values (see CDM Smith 2012 a,b); adequacy will depend upon the value identified as the final RfC for LA.

9.6.4 Filter Loading

The TEM analysis of filters generated from ABS air samples examines only a portion of the total filter. For the purposes of computing concentration in the air sample, it is assumed that the filter is evenly loaded. The assessment of filter loading evenness is evaluated using a Chi-square (CHISQ) test, as described in ISO 10312 Annex F2. If a filter fails the CHISQ test for evenness, the reported result may not be representative of the true concentration in the sample, and the results should be given low confidence. An evaluation of filter loading for the ABS air samples from this study shows that all filters pass the CHISQ test (i.e., p value ≥ 0.001). Thus, it is concluded that uneven filter loading is not of significant concern for the ABS air samples analyzed in this study.

9.6.5 Indirect Preparation of ABS Filters

During TEM analysis, the analytical laboratories noted that the HV filter for 36 ABS air samples was overloaded with particulates (i.e., particulate loading was greater than 25%). For 26 of these ABS air samples, the corresponding LV filter was able to be prepared directly. Because the LV filter represents the same sampling duration but a lower total air sample volume, the only consequence of preparing the LV filter instead of the HV filter is that more grid openings needed to be examined to achieve the analytic requirements.

For the remaining ten ABS air samples, the corresponding LV filter was also determined to be overloaded, thus the sample filter was prepared using an indirect preparation method after ashing in accordance with Libby-specific SOP EPA-LIBBY-08, *Indirect Preparation of Air and Dust Samples for TEM Analysis*. For chrysotile asbestos, indirect preparation often tends to increase structure counts due to dispersion of bundles and clusters (Hwang and Wang 1983; HEI-AR 1991; Breysse 1991). For amphibole asbestos, the effects of indirect preparation are generally much smaller (Bishop *et al.* 1978; Sahle and Laszlo, 1996; Harris 2009; Goldade and O'Brien 2014). Libby-specific studies to evaluate the potential effect of indirect preparation on reported LA air concentrations show that indirect preparation may increase PCME LA air concentrations by a factor of about 2-3 relative to direct preparation (Berry *et al.* 2014).

For the ten samples that were prepared indirectly, all but one sample were reported as non-detect. Based on these considerations, it is concluded that preparation of samples using an

indirect preparation method is a relatively minor source of uncertainty for ABS air samples collected as part of the 2010 ABS investigation.

9.7 Data Quality Conclusions

Taken together, these results indicate that data collected as part of the 2010 residential ABS investigation met the objectives set forth in the governing SAP (EPA 2010a); collected samples were spatially and temporally representative and the target number of samples and analyses were completed for all ABS scenarios. Additionally, ABS sample filter preparation methods and filter loading are not expected to negatively impact data quality, field and laboratory oversight efforts did not identify any QA issues that would affect data use, and any issues identified during the data verification effort were resolved. However, there were two issues identified that have the potential to affect data quality and result interpretation.

First, preliminary information suggests that the laboratory that performed most of the TEM analyses for ABS air samples collected in this investigation has a narrower definition of the chemical compositions included in the LA assignment, meaning that reported ABS air concentrations in this report have the potential to be biased low.

Second, only a subset of the ABS air samples collected as part of Scenarios 1-3 were included in the supplemental evaluation. For Scenario 1, only ABS air samples collected at Category 4 properties were included in the supplemental evaluation. For Scenario 2, only ABS air samples for VV – gardens were included. For Scenario 3, only ABS air samples for VV + driveways were included. As discussed in CDM Smith (2012a, b), the achieved analytical sensitivities for the original (2010-2011) analyses were not adequate to support decision-making relative to the draft LA-specific toxicity values. Thus, it may be necessary to perform additional supplemental analyses to support the human health risk assessment depending upon value identified as the final LA-specific RfC.

This page intentionally left blank to facilitate double-sided printing.

10 REFERENCES

Amandus, H.E., and Wheeler, R. 1987. The Morbidity and Mortality of Vermiculite Miners and Millers Exposed to Tremolite-Actinolite: Part II Mortality. *American Journal of Industrial Medicine* 11:15-26.

Amandus, H.E., Wheeler, P.E., Jankovic, J., and Tucker, J. 1987. The Morbidity and Mortality of Vermiculite Miners and Millers Exposed to Tremolite-Actinolite: Part I Exposure Estimates. *American Journal of Industrial Medicine*. 11:1-14.

Antao, V.C.,Larson, T.C., Horton, D.K. 2012. Libby vermiculite exposure and risk of developing asbestos-related lung and pleural diseases. *Current Opinion in Pulmonary Medicine* 18(2):161-167.

Berry, D. *et al.* 2014. Comparison of Amphibole Air Concentrations Resulting from Direct and Indirect Filter Preparation and Transmission Electron Microscopy Analysis. *[manuscript in review]*

Bishop K, Ring S, Suchanek R, Gray D. 1978. Preparation Losses and Size Alterations for Fibrous Mineral Samples. *Scanning Electron Microsc.* I:207.
Breysse PN. 1991. Electron Microscopic Analysis of Airborne Asbestos Fibers. *Crit. Rev. Analyt. Chem*. 22:201-227.

CB&I. 2013. Annual QA/QC Summary Report (2010-2012) for Task Order 2019 Quality Assurance (QA) Support for the Libby Asbestos Site. November 2013.

CDM Smith. 2010. Quality Assurance Field Audit Report - Activity Based Sampling in Libby, Montana, US. EPA Contract No. EP-W-05-049, by Karen J Repine, Auditor, COM-Libby, dated September 20, 2010.

_____. 2012a. Memorandum: 2010 Outdoor ABS Supplemental Analysis Recommendations, Libby Asbestos Superfund Site, Operable Unit 4. Provided to EPA Region 8 from CDM Smith, dated November 6, 2012.

_____. 2012b. Memorandum: OU4 Outdoor ABS Supplemental Analysis Recommendations. Provided to EPA Region 8 from CDM Smith, dated October 3, 2012.

EPA (U.S. Environmental Protection Agency). 2003. Draft Final Libby Asbestos Site Residential/Commercial Action Level and Clearance Criteria Technical Memorandum. December 15.

_____. 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process – EPA QA/G4*. U.S. Environmental Protection Agency, Office of Environmental Information. EPA/240/B-06/001. February. http://www.epa.gov/quality/qs-docs/g4-final.pdf

_____. 2008. *Framework for Investigating Asbestos-Contaminated Sites.* Report prepared by the Asbestos Committee of the Technical Review Workgroup of the Office of Solid Waste and Emergency Response, U.S. Environmental protection Agency. OSWER Directive #9200.0-68. http://epa.gov/superfund/health/contaminants/asbestos/pdfs/framework_asbestos_guidance.pdf

_____. 2010a. Sampling and Analysis Plan: Supplemental Activity-Based Sampling, Operable Unit 4, Libby Asbestos Superfund Site. June.

_____. 2010b. Activity-Based Sampling Summary Report, Operable Unit 4, Libby, Montana, Superfund Site. U.S. Environmental Protection Agency, Region 8. June.

_____. 2011a. *Toxicological Review of Libby Amphibole Asbestos*. Submitted to the Scientific Advisory Board (SAB). U.S. Environmental Protection Agency, Washington D.C. EPA/635/R-11/002A. External Review Draft – August. http://cfpub.epa.gov/ncea/iris_drafts/recordisplay.cfm?deid=235092

_____. 2011b. *National Functional Guidelines for Asbestos Data Review.* U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. Draft – August.

_____. 2012. EPA Data Management Plan, Libby Asbestos Superfund Site. U.S. Environmental Protection Agency, Emergency Response DATA Team. Version 2012.1 – January 18, 2012.

Goldade, M.P., and O'Brien, W.P. 2014. Use of Direct Versus Indirect Preparation Data for Assessing Risk Associated with Airborne Exposures at Asbestos-contaminated Sites. *Journal of Occupational and Environmental Hygiene* 11(2):67-76. http://dx.doi.org/10.1080/15459624.2013.843779

Harris, J. 2009. TEM Observations of Amphiboles from El Dorado Hills Study. Geological Society of America Abstracts with Programs, October 21, 2009. Vol. 41, No. 7, p. 703.

Hwang and Wang. 1983. Comparison of Methods of Assessing Fiber Concentrations. *Arch. Environ. Health* 38:5-10.

HEI-AR (Health Effects Institute – Asbestos Research). 1991. Asbestos in Public and Commercial Buildings: A Literature Review and Synthesis of Current Knowledge. Health Effects Institute – Asbestos Research. Cambridge, Massachusetts.

ISO (International Organization for Standardization). 1995. Ambient Air – Determination of asbestos fibers – Direct-transfer transmission electron microscopy method. ISO 10312:1995(E).

Larson, T.C., Meyer, C.A., Kapil, V., Gurney, J.W., Tarver, R.D., Black, C.B., and Lockey, J.E. 2010. Workers with Libby Amphibole Exposure: Retrospective Identification and Progression of Radiographic Changes. *Radiology* 255(3):924-933.

Larson, T.C., Lewin, M., Gottschall, E.B., Antao, V.C., Kapil, V., Rose, C.S. 2012a. Associations between radiographic findings and spirometry in a community exposed to Libby amphibole. *Occup. Environ Med*. 69(5):361-6.

Larson, T.C., Antao, A.C., Bove, F.J., Cusack, C. 2012b. Association Between Cumulative Fiber Exposure and Respiratory Outcomes Among Libby Vermiculite Workers. *J. Occup. Environ. Med.* 54(1): 56-63.

McDonald, J.C., McDonald, A.D., Armstrong, B., and Sebastien, P. 1986. Cohort Study of Mortality of Vermiculite Miners Exposed to Tremolite. *British Journal of Industrial Medicine* 43:436-444.

McDonald, J.C., Harris, J., Armstrong, B. 2004. Mortality in a cohort of vermiculite miners exposed to fibrous Amphibole in Libby, Montana. *Occup. Environ. Med.* 61:363-366.

Meeker, G.P., Bern, A.M., Brownfield, I.K., Lowers, H.A., Sutley, S.J., Hoeffen, T.M., Vance, J.S. 2003. The Composition and Morphology of Amphiboles from the Rainy Creek Complex, Near Libby, Montana. *American Mineralogist* 88:1955-1969.

Peipins, L.A., Lewin, M., Campolucci, S., Lybarger, J.A., Kapil, V., Middleton, D., Miller, A., Weis, C., Spence, M., and Black, B., 2003. Radiographic Abnormalities and Exposure to Asbestos-Contaminated Vermiculite in the Community of Libby, Montana, USA. *Environmental Health Perspectives* 111:1753-1759.

Sahle W and Laszlo I. 1996. Airborne Inorganic Fibre Monitoring by Transmission Electron Microscope (TEM): Comparison of Direct and Indirect Sample Transfer Methods. *Ann. Occup. Hyg.* 40:29-44.

Shaw E&I (Shaw Environmental & Infrastructure Group). 2012a. *Summary on-site audit report for EMSL Analytical, Inc. in Denver, CO.* Prepared by Shaw E&I, EPA QATS contractor. Document ID No. 1019-06262012-1; June 26, 2012.

_____. 2012b. *Summary on-site audit report for EMSL Analytical, Inc. in Libby, MT.* Prepared by Shaw E & I, EPA QATS contractor. Document ID No. 1019-09132012-1; September 13, 2012.

_____. 2012c. *Summary on-site audit report for EMSL Analytical, Inc. in Cinnaminson, NJ.* Prepared by Shaw E & I, EPA QATS contractor. Document ID No. 1019-07262012-1; July 26, 2012.

_____. 2012d. *Summary on-site audit report for the ESAT Region 8 Laboratory in Golden, CO.* Prepared by Shaw E & I, EPA QATS contractor. Document ID No. 1019-06262012-2; June 26, 2012.

_____. 2012e. *Summary on-site audit report for Hygeia Laboratories, Inc. in Sierra Madre, CA.* Prepared by Shaw E & I, EPA QATS contractor. Document ID No. 1019-08242012-1; August 24, 2012.

_____. 2012f. *Summary on-site audit report for Reservoirs Environmental, Inc. in Denver, CO.* Prepared by Shaw E & I, EPA QATS contractor. Document ID No. 1019-10182012-1; October 18, 2012.

_____. 2012g. *Summary On-site Audit Report for the ESAT Sample Preparation Facility (SPF) in Troy, MT.* Prepared by Shaw E & I, EPA QATS contractor. Document ID No. 1019-09122012-1; September 12, 2012.

Sullivan, P.A. 2007. Vermiculite, Respiratory Disease and Asbestos Exposure in Libby, Montana: Update of a Cohort Mortality Study. *Environmental Health Perspectives* 115(4):579-585.

TechLaw, Inc. 2013. EMSL-Libby LA Structure Classification Deliberative Report. Prepared for U.S. Environmental Protection Agency, Region 8. December 10.

Whitehouse, A.C. 2004. Asbestos-related pleural disease due to tremolite associated with progressive loss of lung function: serial observations in 123 miners family members, and residents of Libby, Montana. *Am. J. Ind. Med.* 46:219-225.

Whitehouse A.C., Black C.B., Heppe M.S., Ruckdeschel J., Levin S.M. 2008. Environmental exposure to Libby asbestos and mesotheliomas. *Am. J. Ind. Med.*51:877-880.

Data Summary Report
2010 Residential Activity-Based Sampling
Libby Asbestos Superfund Site, Montana

TABLES

This page intentionally left blank to facilitate double-sided printing.

TABLE 3-1
TARGET ANALYTICAL SENSITIVITY FOR EACH ABS SCENARIO
Libby Asbestos Superfund Site, Libby, Montana

ABS Scenario	Original Target Analytical Sensitivity (cc^{-1})	2013 Supplemental Target Analytical Sensitivity (cc^{-1})
1: Residential yards	0.002	0.0005
2: Residential gardens	0.003	0.001
3: Residential driveways	0.004	0.0033
4: Driving on roads	0.001	0.00033
5: Bike riding (adult)	0.005	0.0022
5: Bike riding (trailer)	0.01	0.013

Notes:
cc^{-1} = per cubic centimeter
ABS = activity-base sampling

TABLE 4-1

2010 ABS ANALYSIS SUMMARY - PRESCREENING RESULTS

Libby Asbestos Superfund Site, Libby, Montana

Property ID	Sample ID	Visible Vermiculite				PLM-VE LA Bin
		N	L	M	H	
AD-000025	EX-10001	30	0	0	0	B1
AD-000126	EX-10162	30	0	0	0	A
AD-000258	EX-10165	2	28	0	0	B1
AD-000262	EX-10166	30	0	0	0	B1
AD-000381	EX-10168	30	0	0	0	B1
AD-000415	EX-10171	26	4	0	0	B2
AD-000785	EX-10511	6	20	4	0	A
AD-001731	EX-10063	10	16	2	2	B1
AD-001731	EX-10062	17	13	0	0	B1
AD-001867	EX-10066	25	5	0	0	B1
AD-001868	EX-10065	23	6	1	0	B1
AD-002028	EX-10061	20	10	0	0	B1
AD-002066 *	EX-10161	24	6	0	0	A
AD-002156	EX-10681	30	0	0	0	A
AD-002170 *	EX-10003	30	0	0	0	A
AD-002195 *	EX-10163	25	5	0	0	A
AD-002501	EX-10004	30	0	0	0	B1
AD-002515	EX-10170	20	6	4	0	B1
AD-002564	EX-10701	30	0	0	0	A
AD-002564	EX-10702	30	0	0	0	A
AD-002632	EX-10682	25	5	0	0	A
AD-002697	EX-10657	16	14	0	0	B2
AD-002990	EX-10705	25	5	0	0	A
AD-003052	EX-10002	30	0	0	0	B1
AD-003226	EX-10164	25	5	0	0	A
AD-003324 *	EX-10064	1	5	20	4	B1
AD-003995	EX-10703	30	0	0	0	A
AD-004362	EX-10167	30	0	0	0	B1

Notes:

ABS - activity-based sampling

ID - identification

Visible Vermiculite - N - None; L - Low; M - Medium; H - High

PLM-VE - polarized light microscopy-visual estimation

LA - Libby amphibole

* Property was not selected for further sampling.

TABLE 4-2
2010 ABS ANALYSIS SUMMARY - SCENARIO 1: WORKING IN RESIDENTIAL YARDS
Libby Asbestos Superfund Site, Libby, Montana

Event	Category	Property ID	Soil							ABS Air						
			Sample ID	Soil Moisture (%)	Visible Vermiculite				PLM-VE LA Bin	Sample ID	Filter Type	Total LA		PCME LA		
					N	L	M	H				Sensitivity (cc^{-1})	Air Conc. (s/cc)	Sensitivity (cc^{-1})	Air Conc. (s/cc)	
Event 1	Category 1	AD-001867	EX-10493	12.5	27	3	0	0	A	EX-10494	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000025	EX-10608	13.2	30	0	0	0	A	EX-10609	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-003052	EX-10434	12.0	30	0	0	0	A	EX-10435	EX-LV	2.0E-03	0.0040	2.0E-03	0.0020	
		AD-002501	EX-10441	16.5	30	0	0	0	B1	EX-10442	EX-HV	1.9E-03	0	1.9E-03	0	
		AD-002515	EX-10604	13.1	20	10	0	0	A	EX-10606	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002564	EX-10649	18.3	30	0	0	0	B1	EX-10652	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002697	EX-10658	18.1	18	12	0	0	B1	EX-10659	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-003995	EX-10638	9.8	30	0	0	0	A	EX-10639	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002632	EX-10706	12.6	17	13	0	0	B1	EX-10707	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-003226	EX-10875	13.8	30	0	0	0	A	EX-10877	EX-LV	3.0E-03	0	3.0E-03	0	
	Category 2	AD-001853	EX-10006	24.0	30	0	0	0	A	EX-10009	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001732	EX-10430	11.1	30	0	0	0	A	EX-10431	EX-HV	1.9E-03	0	1.9E-03	0	
		AD-001865	EX-10075	25.6	30	0	0	0	A	EX-10076	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002041	EX-10207	15.8	30	0	0	0	A	EX-10210	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000065	EX-10467	12.3	30	0	0	0	B1	EX-10468	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000180	EX-10260	10.8	30	0	0	0	A	EX-10258	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001628	EX-10231	26.6	30	0	0	0	A	EX-10228	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002032	EX-10755	5.9	30	0	0	0	A	EX-10756	EX-HV	5.6E-03	0	5.6E-03	0	IA
		AD-001991	EX-10759	17.3	30	0	0	0	A	EX-10761	EX-LV	3.0E-03	0	3.0E-03	0	
		AD-001815	EX-11106	20.2	30	0	0	0	A	EX-11107	EX-HV	2.0E-03	0	2.0E-03	0	
	Category 3	AD-000146	EX-10069	8.7	26	4	0	0	A	EX-10070	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000244	EX-10082	16.4	29	1	0	0	A	EX-10083	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000293	EX-10407	33.1	29	1	0	0	A	EX-10408	EX-HV	1.9E-03	0	1.9E-03	0	
		AD-001631	EX-10516	25.6	25	5	0	0	A	EX-10517	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001616	EX-10227	15.5	30	0	0	0	A	EX-10224	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000444	EX-10213	8.6	30	0	0	0	A	EX-10212	EX-LV	2.0E-03	0	2.0E-03	0	
		AD-000769	EX-10478	32.6	27	3	0	0	A	EX-10485	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001587	EX-10417	10.9	30	0	0	0	A	EX-10418	EX-HV	1.9E-03	0	1.9E-03	0	
		AD-001511	EX-10240	15.4	27	3	0	0	A	EX-10241	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000933	EX-10551	23.6	30	0	0	0	A	EX-10552	EX-HV	2.0E-03	0	2.0E-03	0	
	Category 4	AD-001731	EX-10453	19.1	14	16	0	0	B1	EX-10454	EX-HV	[R]	[R]	4.8E-04	0.0014	
		AD-001868	EX-10539	21.1	27	3	0	0	B1	EX-10541	EX-LV	2.0E-03	0	4.9E-04	0	+
		AD-002028	EX-10501	21.3	28	2	0	0	B1	EX-10502	EX-HV	2.0E-03	0	4.8E-04	0	+
		AD-000785	EX-10594	25**	13	10	7	0	B1	EX-10595	EX-HV	2.0E-03	0	4.8E-04	0	+
		AD-000415	EX-10612	23.1	28	2	0	0	A	EX-10614	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-000258	EX-10520	18.4	20	10	0	0	A	EX-10601	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-004362	EX-10619	26.4	30	0	0	0	A	EX-10620	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-000381	EX-10642	23.2	30	0	0	0	B1	EX-10647	EX-HV	1.9E-03	0	4.8E-04	0	+
		AD-000262	EX-10731	24.9	25	5	0	0	A	EX-10732	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-002990	EX-10739	10.6	18	12	0	0	B1	EX-10741	EX-LV	3.0E-03	0	5.0E-04	0	+
Event 2	Category 1	AD-001867	EX-10695	9.6	29	1	0	0	A	EX-10696	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000025	EX-10983	7.0	30	0	0	0	B1	EX-10985	EX-LV	1.9E-02	0	1.9E-02	0	IA
		AD-003052	EX-10666	14.6	30	0	0	0	B1	EX-10671	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002501	EX-10683	17.8	30	0	0	0	A	EX-10684	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002515	EX-10909	13.4	25	5	0	0	A	EX-10912	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002564	EX-10767	8.8	30	0	0	0	B1	EX-10768	EX-HV	9.5E-03	0	9.5E-03	0	IA
		AD-002697	EX-10779	21.1	11	19	0	0	B1	EX-10780	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-003995	EX-10915	7.7	30	0	0	0	B1	EX-10916	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002632	EX-11022	21.1	26	4	0	0	B1	EX-11023	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-003226	EX-10959	8.7	30	0	0	0	A	EX-11001	EX-LV	3.1E-03	0	3.1E-03	0	
	Category 2	AD-001853	EX-10524	<30*	30	0	0	0	A	EX-10521	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001732	EX-10634	10.7	30	0	0	0	A	EX-10635	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001865	EX-10489	26.9	30	0	0	0	A	EX-10490	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002041	EX-10964	10.5	30	0	0	0	A	EX-10965	EX-HV	1.7E-03	0	1.7E-03	0	
		AD-000065	EX-10894	18.0	30	0	0	0	A	EX-10895	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000180	EX-10868	13.1	30	0	0	0	A	EX-10870	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001628	EX-10979	27.4	30	0	0	0	A	EX-10980	EX-HV	1.8E-03	0	1.8E-03	0	
		AD-002032	EX-10994	12.0	30	0	0	0	A	EX-10995	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001991	EX-10998	17.2	30	0	0	0	A	EX-11000	EX-LV	3.0E-03	0	3.0E-03	0	
		AD-001815	EX-11150	19.2	30	0	0	0	A	EX-11151	EX-HV	2.0E-03	0	2.0E-03	0	
	Category 3	AD-000146	EX-10235	16.4	26	4	0	0	A	EX-10232	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000244	EX-10728	17.2	29	1	0	0	A	EX-10729	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000293	EX-10886	29.0	29	1	0	0	B1	EX-10887	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001631	EX-10743	18.4	30	0	0	0	B1	EX-10744	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001616	EX-10590	15.6	26	4	0	0	B1	EX-10591	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000444	EX-10497	9.9	30	0	0	0	A	EX-10498	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000769	EX-10879	25.7	25	5	0	0	A	EX-10881	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001587	EX-10559	13.1	23	7	0	0	A	EX-10561	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001511	EX-10587	11.3	25	5	0	0	A	EX-10588	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000933	EX-10710	10.0	29	1	0	0	A	EX-10711	EX-HV	2.0E-03	0	2.0E-03	0	
	Category 4	AD-001731	EX-10529	15.3	13	16	1	0	B1	EX-10531	EX-LV	[R]	[R]	4.8E-04	0.0019	
		AD-001868	EX-10864	17.5	26	4	0	0	B1	EX-10865	EX-HV	2.0E-03	0	4.4E-04	0.0013	+
		AD-002028	EX-10923	12.4	28	2	0	0	B1	EX-10928	EX-HV	2.0E-03	0	4.7E-04	0.0038	+
		AD-000785	EX-10775	29.1	17	6	7	0	A	EX-10776	EX-HV	2.0E-03	0	4.9E-04	0.0015	+
		AD-000415	EX-11030	23.1	28	2	0	0	A	EX-11031	EX-HV	2.0E-03	0	4.7E-04	0	+
		AD-000258	EX-10937	10.9	24	6	0	0	A	EX-10938	EX-HV	2.0E-03	0	4.8E-04	0.0015	+
		AD-004362	EX-10898	24.4	30	0	0	0	A	EX-10902	EX-HV	1.9E-03	0	4.8E-04	0	+
		AD-000381	EX-11019	21.2	30	0	0	0	B1	EX-11020	EX-HV	2.9E-03	0	4.7E-04	0	+
		AD-000262	EX-10904	28.4	30	0	0	0	B1	EX-10905	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-002990	EX-10955	7.8	23	7	0	0	A	EX-10957	EX-LV	3.1E-03	0	4.9E-04	0.0029	+

TABLE 4-2
2010 ABS ANALYSIS SUMMARY - SCENARIO 1: WORKING IN RESIDENTIAL YARDS
Libby Asbestos Superfund Site, Libby, Montana

Event	Category	Property ID	Soil							ABS Air						
			Sample ID	Soil Moisture (%)	Visible Vermiculite				PLM-VE LA Bin	Sample ID	Filter Type	Total LA		PCME LA		
					N	L	M	H				Sensitivity (cc^{-1})	Air Conc. (s/cc)	Sensitivity (cc^{-1})	Air Conc. (s/cc)	
Event 3	Category 1	AD-001867	EX-10944	7.0	28	2	0	0	A	EX-10945	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000025	EX-11307	15.3	30	0	0	0	B1	EX-11308	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-003052	EX-11011	22.5	30	0	0	0	B1	EX-11013	EX-HV	2.9E-03	0	2.9E-03	0	
		AD-002501	EX-11404	24.1	30	0	0	0	B1	EX-11405	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002515	EX-11209	22.5	25	5	0	0	B1	EX-11210	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002564	EX-11033	18.5	30	0	0	0	A	EX-11034	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002697	EX-11086	27.2	6	24	0	0	A	EX-11087	EX-HV	1.8E-03	0	1.8E-03	0	
		AD-003995	EX-11065	13.6	30	0	0	0	B1	EX-11066	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002632	EX-11219	24.5	24	6	0	0	B1	EX-11220	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-003226	EX-11139	20.2	30	0	0	0	B1	EX-11140	EX-HV	1.2E-03	0	1.2E-03	0	
	Category 2	AD-001853	EX-10735	25.0	30	0	0	0	A	EX-10736	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001732	EX-11049	11.1	30	0	0	0	A	EX-11050	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001865	EX-10719	29.8	30	0	0	0	A	EX-10961	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002041	EX-11170	25.3	30	0	0	0	A	EX-11171	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000065	EX-11193	21.2	30	0	0	0	A	EX-11194	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000180	EX-11155	19.5	30	0	0	0	A	EX-11157	EX-LV	3.0E-03	0	3.0E-03	0	
		AD-001628	EX-11272	26.3	30	0	0	0	B1	EX-11273	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002032	EX-11061	14.7	30	0	0	0	B1	EX-11062	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001991	EX-11057	22.5	30	0	0	0	A	EX-11058	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001815	EX-11276	12.0	30	0	0	0	A	EX-11277	EX-HV	1.3E-03	0	1.3E-03	0	
	Category 3	AD-000146	EX-10567	19.6	25	5	0	0	B1	EX-10568	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000244	EX-11184	19.5	29	1	0	0	A	EX-11185	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000293	EX-11280	22.9	29	1	0	0	A	EX-11401	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001631	EX-10951	27.2	30	0	0	0	A	EX-10952	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001616	EX-11200	24.9	27	3	0	0	A	EX-11281	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000444	EX-11110	21.5	28	2	0	0	A	EX-11111	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000769	EX-11114	28.1	26	4	0	0	A	EX-11115	EX-HV	1.7E-03	0	1.7E-03	0	
		AD-001587	EX-11123	13.9	23	7	0	0	A	EX-11121	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001511	EX-11135	17.8	25	5	0	0	A	EX-11136	EX-HV	1.9E-03	0	1.9E-03	0	
		AD-000933	EX-11166	23.7	28	2	0	0	A	EX-11167	EX-HV	2.0E-03	0	2.0E-03	0	
	Category 4	AD-001731	EX-11261	21.6	14	16	0	0	B2	EX-11262	EX-HV	2.0E-03	0	5.0E-04	0.00099	+
		AD-001868	EX-11128	18.1	27	2	1	0	B2	EX-11129	EX-HV	2.0E-03	0	4.7E-04	0	+
		AD-002028	EX-11254	17.1	29	1	0	0	B1	EX-11255	EX-HV	2.0E-03	0	4.8E-04	0	+
		AD-000785	EX-11078	30.2	15	12	3	0	B1	EX-11079	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-000415	EX-11303	15.7	29	1	0	0	A	EX-11304	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-000258	EX-11314	23.3	25	5	0	0	B1	EX-11315	EX-HV	2.0E-03	0	5.0E-04	0	+
		AD-004362	EX-11216	23.5	30	0	0	0	A	EX-11217	EX-HV	2.0E-03	0	4.9E-04	0	+
		AD-000381	EX-11236	21.1	30	0	0	0	B1	EX-11237	EX-HV	2.9E-03	0	4.9E-04	0	+
		AD-000262	EX-11069	24.0	30	0	0	0	A	EX-11070	EX-HV	2.0E-03	0	4.8E-04	0	+
		AD-002990	EX-11177	18.2	21	6	3	0	B2	EX-11178	EX-HV	2.0E-03	0	4.9E-04	0	+

* Moisture values not recorded; average was <30%
** Used "Hand Appearance Method" from Outdoor ABS SAP, result was 75% moisture deficient
[R] = The original analysis was rejected and replaced (replacement analysis was low magnification, thus no total LA results available)
+ Supplemental analysis performed; PCME LA results reflect pooled concentration (across original and supplemental analysis).
IA = Filter was overloaded; filter was prepared using an indirect preparation method (with ashing)

pooled across high volume and low volume filters

Category Descriptions:
Category 1 - no soil removal required; PLM Bin B1 in yard
Category 2 - soil removal complete; VV- in yard
Category 3 - soil removal complete; VV+ in yard
Category 4 - soil removal required; PLM Bin B2 or C in yard

Notes:
ABS - activity-based sampling
ID - identification
VV - visible vermiculite
Visible Vermiculite - N - None; L - Low; M - Medium; H - High
PLM-VE - polarized light microscopy - visual estimation
LA - Libby amphibole
PCME - phase contrast light microscopy-equivalent
s/cc - structures per cubic centimeter of air

TABLE 4-3
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 1 (CATEGORY 4 PROPERTIES)
Libby Asbestos Superfund Site, Libby, Montana

ABS Event	Sample Number	Sample Volume (liters)	Original Analysis				Supplemental Analysis				Pooled Sensitivity $(cc)^{-1}$	Pooled PCME LA Air Conc. (s/cc)
			GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)	Addt'l GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)		
Event 1	EX-10454**	296	0	0.0E+00	1	6.7E-04	150	6.7E-04	1	6.7E-04	**USE REANALYSIS	
	EX-10454	296	208	4.8E-04	3	1.4E-03	REANALYSIS				4.8E-04	1.4E-03
	EX-10541	129	115	2.0E-03	0	0.0E+00	350	6.6E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-10502	311	48	2.0E-03	0	0.0E+00	150	6.3E-04	0	0.0E+00	4.8E-04	0.0E+00
	EX-10595	272	55	2.0E-03	0	0.0E+00	170	6.4E-04	0	0.0E+00	4.8E-04	0.0E+00
	EX-10614	294	51	2.0E-03	0	0.0E+00	155	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-10601	306	49	2.0E-03	0	0.0E+00	150	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-10620	294	51	2.0E-03	0	0.0E+00	155	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-10647	280	55	1.9E-03	0	0.0E+00	165	6.4E-04	0	0.0E+00	4.8E-04	0.0E+00
	EX-10732	240	62	2.0E-03	0	0.0E+00	190	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-10741	129	77	3.0E-03	0	0.0E+00	385	6.0E-04	0	0.0E+00	5.0E-04	0.0E+00
Event 2	EX-10531**	135	0	0.0E+00	4	1.9E-03	458	4.8E-04	4	1.9E-03	**USE REANALYSIS	
	EX-10531	135	458	4.8E-04	4	1.9E-03	REANALYSIS				4.8E-04	1.9E-03
	EX-10865	305	49	2.0E-03	0	0.0E+00	174	5.6E-04	3	1.7E-03	4.4E-04	1.3E-03
	EX-10928	300	50	2.0E-03	0	0.0E+00	158	6.2E-04	8	5.0E-03	4.7E-04	3.8E-03
	EX-10776	253	59	2.0E-03	0	0.0E+00	182	6.4E-04	3	1.9E-03	4.9E-04	1.5E-03
	EX-11031	301	50	2.0E-03	0	0.0E+00	160	6.1E-04	0	0.0E+00	4.7E-04	0.0E+00
	EX-10938	289	52	2.0E-03	0	0.0E+00	160	6.4E-04	3	1.9E-03	4.8E-04	1.5E-03
	EX-10902	289	53	1.9E-03	0	0.0E+00	160	6.4E-04	0	0.0E+00	4.8E-04	0.0E+00
	EX-11020	289	35	2.9E-03	0	0.0E+00	181	5.7E-04	0	0.0E+00	4.7E-04	0.0E+00
	EX-10905	314	48	2.0E-03	0	0.0E+00	145	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-10957	123	77	3.1E-03	0	0.0E+00	415	5.8E-04	6	3.5E-03	4.9E-04	2.9E-03
Event 3	EX-11262	289	52	2.0E-03	0	0.0E+00	154	6.7E-04	2	1.3E-03	5.0E-04	9.9E-04
	EX-11129	253	60	2.0E-03	0	0.0E+00	190	6.2E-04	0	0.0E+00	4.7E-04	0.0E+00
	EX-11255	289	52	2.0E-03	0	0.0E+00	160	6.4E-04	0	0.0E+00	4.8E-04	0.0E+00
	EX-11079	284	53	2.0E-03	0	0.0E+00	160	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-11304	253	59	2.0E-03	0	0.0E+00	178	6.6E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-11315	259	58	2.0E-03	0	0.0E+00	172	6.6E-04	0	0.0E+00	5.0E-04	0.0E+00
	EX-11217	284	53	2.0E-03	0	0.0E+00	160	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-11237	289	35	2.9E-03	0	0.0E+00	175	5.9E-04	0	0.0E+00	4.9E-04	0.0E+00
	EX-11070	289	52	2.0E-03	0	0.0E+00	160	6.4E-04	0	0.0E+00	4.8E-04	0.0E+00
	EX-11178	248	60	2.0E-03	0	0.0E+00	183	6.5E-04	0	0.0E+00	4.9E-04	0.0E+00

Notes:
ABS - activity-based sampling
ID - identification
Visible Vermiculite - N - None; L - Low; M - Medium; H - High
PLM-VE - polarized light microscopy - visual estimation
LA - Libby amphibole
PCME - phase contrast light microscopy-equivalent
s/cc - structures per cubic centimeter of air

TABLE 4-4
SUMMARY STATISTICS BY CATEGORY FOR SCENARIO 1
Libby Asbestos Superfund Site, Libby, Montana

Soil Condition Category	No. of ABS Air Samples	No. of Samples w/ LA Detected	Mean PCME LA Air Conc. (s/cc)	Mean Sensitivity $(cc)^{-1}$
1 - no soil clean-up required, with PLM-VE Bin B1 in yard	30	1	0.000066	0.003
2 - soil clean-up complete; no VV present in yard	30	0	0	0.002
3 - soil clean-up complete; VV present in yard	30	0	0	0.002
4 - soil clean-up still required, with PLM-VE Bin B2 or Bin C in yard	30	8	0.00051	0.0005

Category Descriptions:
Category 1 - no soil removal required; PLM Bin B1 in yard
Category 2 - soil removal complete; VV- in yard
Category 3 - soil removal complete; VV+ in yard
Category 4 - soil removal required; PLM Bin B2 or C in yard

Notes:
ABS = activity-based sampling
cc^{-1} - per cubic centimeter
LA = Libby amphibole
PCME = phase contrast microscopy equivalent
s/cc - structures per cubic centimeter
VV - visible vermiculite

TABLE 4-5. COMPARISON OF PLM-VE TO VISIBLE VERMICULITE STATUS

Panel A: 2010 ABS Program

		Visible Vermiculite	
		VV-	VV+
PLM-VE	A	103	69
	Not A	37	59

concordant	162	60%
total	268	

Panel B: 2007/08 ABS Program

		Visible Vermiculite	
		VV-	VV+
PLM-VE	A	155	102
	Not A	4	50

concordant	205	66%
total	311	

Notes:

PLM-VE - polarized light microscopy-visual estimation

ABS - activity-based sampling

VV - visible vermiculite

TABLE 5-1
2010 ABS ANALYSIS SUMMARY - SCENARIO 2: DIGGING IN RESIDENTIAL GARDENS
Libby Asbestos Superfund Site, Libby, Montana

Event	Pre-ABS VV Category	Location ID	Soil							Air						
			Sample ID	Soil Moisture (%)	Visible Vermiculite				PLM-VE LA Bin	Sample ID	Filter Type	Total LA		PCME LA		
					N	L	M	H				Sensitivity (cc^{-1})	Air Conc. (s/cc)	Sensitivity (cc^{-1})	Air Conc. (s/cc)	
Event 1	VV +	AD-001731	EX-10445	22.5	3	27	0	0	B1	EX-10447	EX-HV	2.7E-03	0	2.7E-03	0	
		AD-001867	EX-10747	13.7	8	22	0	0	A	EX-10748	EX-HV	2.9E-03	0	2.9E-03	0	
		AD-002028	EX-10504	23.8	12	18	0	0	C	EX-10507	EX-HV	2.9E-03	0	2.9E-03	0	
		AD-000785	EX-10512	16.3	18	12	0	0	B1	EX-10514	EX-LV	3.0E-03	0.0030	3.0E-03	0.0030	
		AD-000415	EX-10613	12.2	17	13	0	0	A	EX-10617	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-002515	EX-10542	5.5	0	23	7	0	B1	EX-10543	EX-HV	5.0E-02	0	5.0E-02	0	IA
		AD-000258	EX-10571	20.5	26	4	0	0	A	EX-10573	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000126	EX-10579	24.1	28	2	0	0	A	EX-10580	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-000553	EX-10555	14.1	0	30	0	0	B1	EX-10556	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-001644	EX-10763	14.2	12	18	0	0	A	EX-10764	EX-HV	3.0E-03	0	3.0E-03	0	
	VV -	AD-002388	EX-10623	18.7	30	0	0	0	A	EX-10626	EX-HV	2.0E-03	0	9.8E-04	0	+
		AD-003789	EX-10215	10.4	30	0	0	0	A	EX-10217	EX-LV	3.0E-03	0	1.0E-03	0	+
		AD-003775	EX-10456	28.8	30	0	0	0	A	EX-10457	EX-HV	2.7E-03	0	9.8E-04	0	+
		AD-002759	EX-10463	23.3	30	0	0	0	A	EX-10464	EX-HV	2.7E-03	0	1.0E-03	0	+
		AD-005148	EX-10251	20.9	30	0	0	0	A	EX-10252	EX-HV	3.0E-03	0	9.9E-04	0	+
		AD-001511	EX-10239	17.5	30	0	0	0	B1	EX-10236	EX-HV	2.9E-03	0	9.9E-04	0	+
		AD-000117	EX-10630	22.0	30	0	0	0	A	EX-10631	EX-HV	2.0E-03	0	9.8E-04	0.0010	+
		AD-000381	EX-10643	22.4	30	0	0	0	B1	EX-10645	EX-HV	2.0E-03	0	9.8E-04	0.0010	+
		AD-001864	EX-10678	15.8	30	0	0	0	A	EX-10679	EX-HV	3.0E-03	0	9.9E-04	0	+
		AD-002156	EX-10673	22.3	30	0	0	0	A	EX-10674	EX-HV	2.9E-03	0	9.8E-04	0	+
Event 2	VV +	AD-001731	EX-10532	21.0	3	27	0	0	B1	EX-10533	EX-HV	2.0E-03	0	2.0E-03	0	
		AD-001867	EX-10948	9.8	20	10	0	0	A	EX-10949	EX-HV	2.9E-03	0	2.9E-03	0	
		AD-002028	EX-10925	15.5	19	9	2	0	B2	EX-10926	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-000785	EX-10771	14.7	14	16	0	0	A	EX-10773	EX-LV	3.0E-03	0	3.0E-03	0	
		AD-000415	EX-11026	27.5	18	12	0	0	A	EX-11027	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-002515	EX-10908	5.0	9	21	0	0	B1	EX-10910	EX-HV	2.4E-02	0	2.4E-02	0	IA
		AD-000258	EX-10934	21.6	17	6	7	0	B1	EX-10935	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-000126	EX-10972	20.7	29	1	0	0	A	EX-10973	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-000553	EX-10714	19.1	26	4	0	0	B1	EX-10715	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-001644	EX-11082	20.9	1	29	0	0	B1	EX-11083	EX-HV	5.7E-03	0	5.7E-03	0	
	VV -	AD-002388	EX-10987	13.7	30	0	0	0	A	EX-10988	EX-HV	2.9E-03	0	9.7E-04	0	+
		AD-003789	EX-10699	15.1	30	0	0	0	A	EX-10598	EX-LV	3.0E-03	0	9.8E-04	0	+
		AD-003775	EX-10687	27.4	30	0	0	0	A	EX-10688	EX-HV	3.0E-03	0	9.9E-04	0	+
		AD-002759	EX-10783	25.3	30	0	0	0	A	EX-10784	EX-HV	2.0E-03	0	9.7E-04	0	+
		AD-005148	EX-10653	20.5	30	0	0	0	B1	EX-10655	EX-HV	3.0E-03	0	9.6E-04	0	+
		AD-001511	EX-10583	6.5	30	0	0	0	A	EX-10585	EX-LV	1.1E-02	0	1.0E-03	0	IA+
		AD-000117	EX-10940	23.6	30	0	0	0	A	EX-10941	EX-HV	2.9E-03	0	9.8E-04	0.00098	+
		AD-000381	EX-11015	7.5	30	0	0	0	B1	EX-11016	EX-HV	2.9E-03	0.0029	9.9E-04	0.0039	+
		AD-001864	EX-11037	21.3	30	0	0	0	A	EX-11038	EX-HV	3.0E-03	0	9.7E-04	0	+
		AD-002156	EX-10975	17.5	30	0	0	0	A	EX-10976	EX-HV	5.5E-03	0	9.9E-04	0.0040	IA+
Event 3	VV +	AD-001731	EX-11264	19.2	11	19	0	0	B1	EX-11265	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-001867	EX-11189	14.8	28	2	0	0	A	EX-11190	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-002028	EX-11251	22.3	17	13	0	0	B2	EX-11252	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-000785	EX-11074	12.1	16	14	0	0	A	EX-11075	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-000415	EX-11300	22.6	17	13	0	0	A	EX-11301	EX-HV	2.9E-03	0.0029	2.9E-03	0.0029	
		AD-002515	EX-11205	11.5	14	11	5	0	B1	EX-11207	EX-LV	3.2E-03	0	3.2E-03	0	
		AD-000258	EX-11311	21.3	15	9	6	0	B1	EX-11312	EX-HV	3.0E-03	0	3.0E-03	0	
		AD-000126	EX-11223	25.9	28	2	0	0	A	EX-11224	EX-HV	3.0E-03	0.0030	3.0E-03	0	
		AD-000553	EX-11243	26.4	21	9	0	0	B1	EX-11244	EX-HV	2.9E-03	0.0029	2.9E-03	0.0029	
		AD-001644	EX-11162	25.6	16	14	0	0	B1	EX-11163	EX-HV	2.9E-03	0	2.9E-03	0	
	VV -	AD-002388	EX-11143	18.3	30	0	0	0	A	EX-11145	EX-HV	3.0E-03	0	9.9E-04	0	+
		AD-003789	EX-11090	19.9	30	0	0	0	A	EX-11092	EX-HV	3.9E-03	0	9.9E-04	0	+
		AD-003775	EX-11099	22.1	30	0	0	0	A	EX-11100	EX-HV	3.9E-03	0	9.9E-04	0	+
		AD-002759	EX-11292	24.1	30	0	0	0	A	EX-11294	EX-LV	3.0E-03	0	9.9E-04	0	+
		AD-005148	EX-11239	18.6	30	0	0	0	B1	EX-11240	EX-HV	3.0E-03	0	9.9E-04	0	+
		AD-001511	EX-11132	11.8	30	0	0	0	A	EX-11133	EX-HV	2.9E-03	0	9.9E-04	0	+
		AD-000117	EX-11045	21.3	30	0	0	0	A	EX-11046	EX-HV	3.0E-03	0	9.9E-04	0	+
		AD-000381	EX-11232	5.7	30	0	0	0	B1	EX-11233	EX-HV	2.9E-03	0	9.9E-04	0.0030	+
		AD-001864	EX-11201	19.9	30	0	0	0	A	EX-11202	EX-HV	2.9E-03	0	9.9E-04	0	+
		AD-002156	EX-11267	21.7	30	0	0	0	A	EX-11269	EX-LV	3.2E-03	0	8.9E-04	0.00089	+

+ Supplemental analysis performed; PCME LA results reflect pooled concentration (across original and supplemental analysis).
IA = Filter was overloaded; filter was prepared using an indirect preparation method (with ashing)

Notes:
ABS - activity-based sampling
ID - identification
VV - visible vermiculite
Visible Vermiculite - N - None; L - Low; M - Medium; H - High
PLM-VE - polarized light microscopy - visual estimation
LA - Libby amphibole
PCME - phase contrast light microscopy-equivalent
s/cc - structures per cubic centimeter of air

TABLE 5-2
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 2 (VV - PROPERTIES)
Libby Asbestos Superfund Site, Libby, Montana

ABS Event	Sample Number	Sample Volume (L)	Original Analysis				Supplemental Analysis				Pooled Sensitivity $(cc)^{-1}$	Pooled PCME LA Air Conc. (s/cc)
			GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)	Addt'l GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)		
Event 1	EX-10626	284	53	2.0E-03	0	0.0E+00	53	2.0E-03	0	0.0E+00	9.8E-04	0.0E+00
	EX-10217	129	77	3.0E-03	0	0.0E+00	153	1.5E-03	0	0.0E+00	1.0E-03	0.0E+00
	EX-10457	311	35	2.7E-03	0	0.0E+00	62	1.5E-03	0	0.0E+00	9.8E-04	0.0E+00
	EX-10464	306	36	2.7E-03	0	0.0E+00	61	1.6E-03	0	0.0E+00	1.0E-03	0.0E+00
	EX-10252	277	36	3.0E-03	0	0.0E+00	72	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-10236	290	35	2.9E-03	0	0.0E+00	68	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-10631	284	53	2.0E-03	0	0.0E+00	53	2.0E-03	1	2.0E-03	9.8E-04	9.8E-04
	EX-10645	290	52	2.0E-03	0	0.0E+00	52	2.0E-03	1	2.0E-03	9.8E-04	9.8E-04
	EX-10679	294	34	3.0E-03	0	0.0E+00	68	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-10674	289	35	2.9E-03	0	0.0E+00	70	1.5E-03	0	0.0E+00	9.8E-04	0.0E+00
Event 2	EX-10988	253	40	2.9E-03	0	0.0E+00	81	1.4E-03	0	0.0E+00	9.7E-04	0.0E+00
	EX-10598	135	74	3.0E-03	0	0.0E+00	150	1.5E-03	0	0.0E+00	9.8E-04	0.0E+00
	EX-10688	285	35	3.0E-03	0	0.0E+00	70	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-10784	259	58	2.0E-03	0	0.0E+00	60	1.9E-03	0	0.0E+00	9.7E-04	0.0E+00
	EX-10655	301	33	3.0E-03	0	0.0E+00	70	1.4E-03	0	0.0E+00	9.6E-04	0.0E+00
	EX-10585	127	77	1.1E-02	0	0.0E+00	795	1.1E-03	0	0.0E+00	1.0E-03	0.0E+00
	EX-10941	289	35	2.9E-03	0	0.0E+00	70	1.5E-03	1	1.5E-03	9.8E-04	9.8E-04
	EX-11016	289	35	2.9E-03	1	2.9E-03	69	1.5E-03	3	4.5E-03	9.9E-04	3.9E-03
	EX-11038	295	34	3.0E-03	0	0.0E+00	70	1.4E-03	0	0.0E+00	9.7E-04	0.0E+00
	EX-10976	263	77	5.5E-03	0	0.0E+00	348	1.2E-03	4	4.8E-03	9.9E-04	4.0E-03
Event 3	EX-11145	257	39	3.0E-03	0	0.0E+00	77	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11092	246	31	3.9E-03	0	0.0E+00	90	1.3E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11100	253	30	3.9E-03	0	0.0E+00	88	1.3E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11294	129	77	3.0E-03	0	0.0E+00	154	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11240	284	35	3.0E-03	0	0.0E+00	70	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11133	253	40	2.9E-03	0	0.0E+00	78	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11046	284	35	3.0E-03	0	0.0E+00	70	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11233	289	35	2.9E-03	0	0.0E+00	68	1.5E-03	3	4.5E-03	9.9E-04	3.0E-03
	EX-11202	289	35	2.9E-03	0	0.0E+00	68	1.5E-03	0	0.0E+00	9.9E-04	0.0E+00
	EX-11269	121	77	3.2E-03	0	0.0E+00	198	1.2E-03	1	1.2E-03	8.9E-04	8.9E-04

Notes:
ABS - activity-based sampling
VV - visible vermiculite
L - liter
cc - cubic centimeters
GO - grid opening
LA - Libby amphibole
PCME - phase contrast microscopy equivalent
s/cc - structures per cubic centimeter

TABLE 6-1
2010 ABS ANALYSIS SUMMARY - SCENARIO 3: PLAYING IN RESIDENTIAL DRIVEWAYS
Libby Asbestos Superfund Site, Libby, Montana

Event	Pre-ABS VV Category	Location ID	Soil							Air					
			Sample ID	Soil Moisture (%)	Visible Vermiculite				PLM-VE LA Bin	Sample ID	Filter Type	Sensitivity (cc^{-1})	Air Conc. (s/cc)		
					N	L	M	H					PCME LA	Total LA	
Event 1	VV +	AD-001731	EX-10450	14.3	18	12	0	0	A	EX-10452	EX-LV	3.9E-03	0	0	
		AD-000769	EX-10482	15.8	29	1	0	0	B1	EX-10487	EX-HV	3.9E-03	0	0	
		AD-001587	EX-10416	7.0	24	6	0	0	A	EX-10413	EX-HV	3.6E-03	0	0	
		AD-003789	EX-10221	4.1	19	11	0	0	B1	EX-10222	EX-HV	7.0E-03	0.076	0.18	
		AD-003775	EX-10460	17.4	28	2	0	0	B1	EX-10461	EX-HV	3.1E-03	0.0094	0.013	
		AD-002759	EX-10474	16.7	28	2	0	0	A	EX-10475	EX-HV	3.9E-03	0	0	
		AD-002028	EX-10505	17.5	29	1	0	0	B1	EX-10509	EX-LV	2.0E-03	0	0	
		AD-000258	EX-10576	10.9	27	3	0	0	A	EX-10577	EX-HV	4.0E-03	0	0	
		AD-004362	EX-10535	9.1	30	0	0	0	A	EX-10536	EX-HV	3.9E-03	0	0	
		AD-002122	EX-10420	3.2	27	3	0	0	A	EX-10422	EX-LV	3.9E-03	0	0	
	VV -	AD-002041	EX-10202	2.5*	30	0	0	0	A	EX-10206	EX-HV	3.9E-03	0	0	
		AD-000244	EX-10246	13.0	30	0	0	0	A	EX-10243	EX-HV	3.9E-03	0	0	
		AD-001564	EX-10751	4.2	30	0	0	0	B1	EX-10753	EX-HV	8.8E-03	0	0	IA
		AD-000065	EX-10471	10.4	30	0	0	0	A	EX-10472	EX-HV	4.0E-03	0	0	
		AD-005148	EX-10250	---	30	0	0	0	A	EX-10247	EX-HV	3.9E-03	0	0	++
		AD-000180	EX-10257	8.5	30	0	0	0	A	EX-10254	EX-HV	3.9E-03	0	0	
		AD-002388	EX-10624	19.1	30	0	0	0	A	EX-10628	EX-HV	3.0E-03	0	0	
		AD-001727	EX-10426	13.3	30	0	0	0	A	EX-10427	EX-HV	3.6E-03	0	0	
		AD-003052	EX-10438	7.4	30	0	0	0	A	EX-10439	EX-HV	1.9E-03	0.0019	0.0019	
		AD-001864	EX-10677	17.5	30	0	0	0	A	EX-10862	EX-HV	3.9E-03	0	0	
		AD-005703	EX-10662	18.6	30	0	0	0	A	EX-10663	EX-HV	3.0E-03	0	0	
Event 2	VV +	AD-001731	EX-10525	12.5	22	8	0	0	A	EX-10526	EX-HV	4.0E-03	0	0	
		AD-000769	EX-10880	6.3	27	3	0	0	A	EX-10884	EX-HV	8.4E-03	0	0	IA
		AD-001587	EX-10564	18.7	29	1	0	0	A	EX-10565	EX-HV	3.9E-03	0	0	
		AD-003789	EX-10721	8.4	25	5	0	0	B2	EX-10723	EX-LV	3.0E-03	0.015	0.021	
		AD-003775	EX-10691	13.6	20	10	0	0	A	EX-10692	EX-HV	3.9E-03	0	0	
		AD-002759	EX-10787	16.1	26	4	0	0	A	EX-10788	EX-HV	3.9E-03	0	0	
		AD-002028	EX-10919	9.9	28	2	0	0	A	EX-10920	EX-HV	3.9E-03	0	0	
		AD-000258	EX-10930	5.2	29	1	0	0	A	EX-10931	EX-HV	3.9E-03	0	0	
		AD-004362	EX-10897	19.4	30	0	0	0	A	EX-10899	EX-HV	3.9E-03	0	0	
		AD-002122	EX-10547	4.0	30	0	0	0	B1	EX-10549	EX-LV	4.0E-03	0	0	
	VV -	AD-002041	EX-10968	5.9	30	0	0	0	A	EX-10969	EX-HV	3.9E-03	0	0	
		AD-000244	EX-10724	10.5	30	0	0	0	A	EX-10725	EX-HV	3.9E-03	0	0	
		AD-001564	EX-10794	4.4	30	0	0	0	A	EX-10795	EX-HV	3.9E-03	0	0	
		AD-000065	EX-10890	21.3	30	0	0	0	A	EX-10891	EX-HV	3.9E-03	0	0	
		AD-000180	EX-10869	6.5	30	0	0	0	A	EX-10873	EX-HV	3.9E-03	0	0	
		AD-002388	EX-10991	<30%**	30	0	0	0	A	EX-10992	EX-HV	3.9E-03	0	0	
		AD-001727	EX-10790	5.6	30	0	0	0	A	EX-10791	EX-HV	3.9E-03	0	0	
		AD-003052	EX-10670	18.4	30	0	0	0	B1	EX-10667	EX-HV	3.0E-03	0	0	
		AD-001864	EX-11041	11.4	30	0	0	0	A	EX-11042	EX-HV	3.9E-03	0	0	
		AD-005703	EX-10798	16.2	30	0	0	0	A	EX-10799	EX-HV	3.9E-03	0	0	
Event 3	VV +	AD-001731	EX-11257	9.1	27	3	0	0	B1	EX-11258	EX-HV	3.9E-03	0	0	
		AD-000769	EX-11117	13.3	28	2	0	0	A	EX-11118	EX-HV	3.9E-03	0	0	
		AD-001587	EX-11124	10.0	29	1	0	0	A	EX-11125	EX-HV	3.9E-03	0	0	
		AD-003789	EX-11095	22.5	3	26	1	0	C	EX-11096	EX-HV	3.9E-03	0	0	
		AD-003775	EX-11102	13.6	28	2	0	0	B2	EX-11103	EX-HV	3.9E-03	0	0	
		AD-002759	EX-11295	17.3	29	1	0	0	A	EX-11296	EX-HV	3.9E-03	0	0	
		AD-002028	EX-11247	20.3	28	2	0	0	B1	EX-11248	EX-HV	3.9E-03	0	0	
		AD-000258	EX-11319	12.1	26	4	0	0	A	EX-11320	EX-HV	4.0E-03	0	0	
		AD-004362	EX-11212	20.8	30	0	0	0	B1	EX-11213	EX-HV	3.9E-03	0	0	
		AD-002122	EX-11003	14.1	30	0	0	0	A	EX-11004	EX-HV	3.9E-03	0	0	
	VV -	AD-002041	EX-11173	16.6	30	0	0	0	A	EX-11174	EX-HV	1.5E-03	0	0	
		AD-000244	EX-11181	14.0	30	0	0	0	A	EX-11182	EX-HV	3.9E-03	0	0	
		AD-001564	EX-11288	9.6	30	0	0	0	B1	EX-11289	EX-HV	3.9E-03	0	0	
		AD-000065	EX-11196	22.5	30	0	0	0	A	EX-11197	EX-HV	4.0E-03	0	0	
		AD-000180	EX-11158	13.0	30	0	0	0	A	EX-11159	EX-HV	3.9E-03	0	0	
		AD-002388	EX-11144	12.3	30	0	0	0	A	EX-11147	EX-HV	4.0E-03	0	0	
		AD-001727	EX-11284	18.4	30	0	0	0	B1	EX-11285	EX-HV	4.0E-03	0	0	
		AD-003052	EX-11007	22.7	30	0	0	0	A	EX-11008	EX-HV	3.9E-03	0	0	
		AD-001864	EX-11227	21.9	30	0	0	0	A	EX-11228	EX-HV	3.9E-03	0	0	
		AD-005703	EX-11053	13.6	30	0	0	0	B1	EX-11054	EX-HV	3.9E-03	0	0	

* Probe only inserted 0-1" bgs due to compaction and rock obstructions
** Moisture values not recorded; average was <30%
pooled across high volume and low volume filters
IA = Filter was overloaded; filter was prepared using an indirect preparation method (with ashing)
++ = property was only sampled in Event 1; driveway was paved following Event 1.

Notes:
ABS - activity-based sampling
ID - identification
VV - visible vermiculite
Visible Vermiculite - N - None; L - Low; M - Medium; H - High
PLM-VE - polarized light microscopy - visual estimation
LA - Libby amphibole
PCME - phase contrast light microscopy-equivalent
s/cc - structures per cubic centimeter of air
bgs - below ground surface

TABLE 7-1
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 4 (ALL SAMPLES)
Libby Asbestos Superfund Site, Libby, Montana

ABS Event	Sample ID	Filter Type	Sample Volume (L)	Original Analysis				Supplemental Analysis				Pooled Sensitivity $(cc)^{-1}$	Pooled PCME LA Air Conc. (s/cc)
				GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)	Addt'l GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)		
1	EX-10017	EX-HV	1415	21	1.0E-03	0	0.0E+00	43	4.9E-04	0	0.0E+00	3.3E-04	0.0E+00
2	EX-10022	EX-HV	1435	21	9.8E-04	0	0.0E+00	42	4.9E-04	0	0.0E+00	3.3E-04	0.0E+00
3	EX-10026	EX-HV	1457	21	9.7E-04	0	0.0E+00	41	5.0E-04	0	0.0E+00	3.3E-04	0.0E+00
4	EX-10031	EX-HV	1444	21	9.8E-04	0	0.0E+00	42	4.9E-04	0	0.0E+00	3.3E-04	0.0E+00
5	EX-10038	EX-HV	1399	22	9.6E-04	0	0.0E+00	43	4.9E-04	0	0.0E+00	3.3E-04	0.0E+00
6	EX-10043	EX-HV	1405	22	9.6E-04	0	0.0E+00	43	4.9E-04	0	0.0E+00	3.2E-04	0.0E+00
7	EX-10013	EX-HV	1384	22	9.7E-04	0	0.0E+00	43	5.0E-04	0	0.0E+00	3.3E-04	0.0E+00
8	EX-10047	EX-HV	1378	22	9.8E-04	0	0.0E+00	44	4.9E-04	0	0.0E+00	3.3E-04	0.0E+00
9	EX-10060	EX-HV	1395	22	9.6E-04	0	0.0E+00	43	4.9E-04	0	0.0E+00	3.3E-04	0.0E+00
10	EX-10056	EX-HV	1364	22	9.9E-04	0	0.0E+00	44	4.9E-04	0	0.0E+00	3.3E-04	0.0E+00
11	EX-10051	EX-HV	1281	24	9.6E-04	0	0.0E+00	---	---	---	---	9.6E-04	0.0E+00
12	EX-10181	EX-HV	1322	23	9.7E-04	0	0.0E+00	---	---	---	---	9.7E-04	0.0E+00
13	EX-10185	EX-HV	1346	23	9.6E-04	0	0.0E+00	---	---	---	---	9.6E-04	0.0E+00
14	EX-10183	EX-HV	1322	23	9.7E-04	0	0.0E+00	---	---	---	---	9.7E-04	0.0E+00
15	EX-10193	EX-HV	1312	23	9.8E-04	0	0.0E+00	---	---	---	---	9.8E-04	0.0E+00
16	EX-10189	EX-HV	1277	24	9.7E-04	0	0.0E+00	---	---	---	---	9.7E-04	0.0E+00
17	EX-10191	EX-HV	1287	24	9.6E-04	0	0.0E+00	---	---	---	---	9.6E-04	0.0E+00
18	EX-10200	EX-HV	1291	23	1.0E-03	0	0.0E+00	---	---	---	---	1.0E-03	0.0E+00
19	EX-10196	EX-HV	1322	23	9.7E-04	0	0.0E+00	---	---	---	---	9.7E-04	0.0E+00
20	EX-10198	EX-HV	1322	23	9.7E-04	0	0.0E+00	---	---	---	---	9.7E-04	0.0E+00

Notes:

--- supplemental analysis was not completed

ABS - activity-based sampling
ID - identification
L - liter
GO - grid opening
cc - cubic centimeters
LA - Libby amphibole
PCME - phase contrast microscopy equivalent
Conc. - concentration
s/cc - structures per cubic centimeter

TABLE 8-1
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 5 (RIDER SAMPLES)
Libby Asbestos Superfund Site, Libby, Montana

Sector	Event	Sample ID	Filter Type	Sample Volume (L)	Original Analysis				Supplemental Analysis				Pooled Sensitivity $(cc)^{-1}$	Pooled PCME LA Air Conc. (s/cc)
					GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)	Addt'l GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)		
Sector A	1	EX-10106	EX-HV	287	21	4.9E-03	0	0.0E+00	26	4.0E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10108	EX-HV	292	21	4.8E-03	0	0.0E+00	25	4.1E-03	0	0.0E+00	2.2E-03	0.0E+00
	2	EX-10115	EX-HV	278	21	5.1E-03	0	0.0E+00	28	3.8E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10116	EX-HV	276	22	4.9E-03	0	0.0E+00	27	4.0E-03	0	0.0E+00	2.2E-03	0.0E+00
	3	EX-10263	EX-HV	371	8	1.0E-02	0	0.0E+00	29	2.8E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10264	EX-HV	280	22	4.8E-03	0	0.0E+00	26	4.1E-03	0	0.0E+00	2.2E-03	0.0E+00
	4	EX-10305	EX-HV	253	14	8.4E-03	0	0.0E+00	40	2.9E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10307	EX-HV	276	24	4.5E-03	0	0.0E+00	25	4.3E-03	0	0.0E+00	2.2E-03	0.0E+00
	5	EX-10311	EX-HV	257	15	7.7E-03	0	0.0E+00	38	3.0E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10312	EX-HV	235	29	4.3E-03	0	0.0E+00	28	4.5E-03	0	0.0E+00	2.2E-03	0.0E+00
	6	EX-10316	EX-HV	298	42	2.4E-03	0	0.0E+00	---	---	---	---	2.4E-03	0.0E+00
		EX-10317	EX-HV	263	25	4.5E-03	0	0.0E+00	---	---	---	---	4.5E-03	0.0E+00
	7	EX-10375	EX-HV	261	24	4.7E-03	0	0.0E+00	---	---	---	---	4.7E-03	0.0E+00
		EX-10376	EX-HV	271	25	4.4E-03	0	0.0E+00	---	---	---	---	4.4E-03	0.0E+00
	8	EX-10381	EX-HV	257	25	4.6E-03	0	0.0E+00	---	---	---	---	4.6E-03	0.0E+00
		EX-10383	EX-HV	263	25	4.5E-03	0	0.0E+00	---	---	---	---	4.5E-03	0.0E+00
	9	EX-10385	EX-HV	253	25	4.7E-03	0	0.0E+00	---	---	---	---	4.7E-03	0.0E+00
		EX-10386	EX-HV	270	25	4.4E-03	0	0.0E+00	---	---	---	---	4.4E-03	0.0E+00
	10	EX-10391	EX-HV	257	25	4.6E-03	0	0.0E+00	---	---	---	---	4.6E-03	0.0E+00
		EX-10392	EX-HV	259	25	4.6E-03	0	0.0E+00	---	---	---	---	4.6E-03	0.0E+00
Sector B	1	EX-10093	EX-HV	287	11	9.4E-03	0	0.0E+00	36	2.9E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10094	EX-HV	294	21	4.8E-03	0	0.0E+00	25	4.0E-03	0	0.0E+00	2.2E-03	0.0E+00
	2	EX-10096	EX-HV	289	21	4.9E-03	0	0.0E+00	26	3.9E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10099	EX-HV	274	22	4.9E-03	0	0.0E+00	28	3.9E-03	0	0.0E+00	2.2E-03	0.0E+00
	3	EX-10265	EX-HV	289	21	4.9E-03	0	0.0E+00	26	3.9E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10266	EX-HV	265	23	4.9E-03	0	0.0E+00	30	3.7E-03	0	0.0E+00	2.1E-03	0.0E+00
	4	EX-10275	EX-HV	278	22	4.8E-03	0	0.0E+00	27	3.9E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10276	EX-HV	295	21	4.8E-03	0	0.0E+00	25	4.0E-03	0	0.0E+00	2.2E-03	0.0E+00
	5	EX-10280	EX-HV	263	23	4.9E-03	0	0.0E+00	29	3.9E-03	0	0.0E+00	2.2E-03	0.0E+00
		EX-10281	EX-HV	283	21	5.0E-03	0	0.0E+00	27	3.9E-03	0	0.0E+00	2.2E-03	0.0E+00

TABLE 8-1
SUPPLEMENTAL ANALYSIS SUMMARY FOR 2010 ABS - SCENARIO 5 (RIDER SAMPLES)
Libby Asbestos Superfund Site, Libby, Montana

Sector	Event	Sample ID	Filter Type	Sample Volume (L)	Original Analysis				Supplemental Analysis				Pooled Sensitivity $(cc)^{-1}$	Pooled PCME LA Air Conc. (s/cc)
					GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)	Addt'l GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)		
Sector B (cont.)	6	EX-10338	EX-HV	248	24	5.0E-03	0	0.0E+00	---	---	---	---	5.0E-03	0.0E+00
		EX-10339	EX-HV	263	23	4.9E-03	0	0.0E+00	---	---	---	---	4.9E-03	0.0E+00
	7	EX-10345	EX-HV	263	23	4.9E-03	0	0.0E+00	---	---	---	---	4.9E-03	0.0E+00
		EX-10346	EX-HV	283	21	5.0E-03	0	0.0E+00	---	---	---	---	5.0E-03	0.0E+00
	8	EX-10348	EX-HV	287	21	4.9E-03	0	0.0E+00	---	---	---	---	4.9E-03	0.0E+00
		EX-10350	EX-HV	285	21	4.9E-03	0	0.0E+00	---	---	---	---	4.9E-03	0.0E+00
	9	EX-10397	EX-HV	276	25	4.3E-03	0	0.0E+00	---	---	---	---	4.3E-03	0.0E+00
		EX-10398	EX-HV	319	21	4.4E-03	0	0.0E+00	---	---	---	---	4.4E-03	0.0E+00
	10	EX-10403	EX-HV	259	25	4.6E-03	0	0.0E+00	---	---	---	---	4.6E-03	0.0E+00
		EX-10404	EX-HV	255	25	4.6E-03	0	0.0E+00	---	---	---	---	4.6E-03	0.0E+00
Sector C	1	EX-10287	EX-HV	267	23	4.8E-03	0	0.0E+00	40	2.8E-03	0	0.0E+00	1.8E-03	0.0E+00
		EX-10288	EX-HV	259	23	5.0E-03	0	0.0E+00	40	2.9E-03	0	0.0E+00	1.8E-03	0.0E+00
	2	EX-10291	EX-HV	278	22	4.8E-03	0	0.0E+00	40	2.7E-03	0	0.0E+00	1.7E-03	0.0E+00
		EX-10292	EX-HV	250	24	4.9E-03	0	0.0E+00	40	3.0E-03	0	0.0E+00	1.9E-03	0.0E+00
	3	EX-10301	EX-HV	248	24	5.0E-03	0	0.0E+00	40	3.0E-03	0	0.0E+00	1.9E-03	0.0E+00
		EX-10304	EX-HV	321	11	8.4E-03	0	0.0E+00	40	2.3E-03	0	0.0E+00	1.8E-03	0.0E+00
	4	EX-10324	EX-HV	280	24	4.4E-03	0	0.0E+00	40	2.6E-03	0	0.0E+00	1.7E-03	0.0E+00
		EX-10325	EX-HV	246	27	4.5E-03	0	0.0E+00	40	3.0E-03	0	0.0E+00	1.8E-03	0.0E+00
	5	EX-10327	EX-HV	237	27	4.6E-03	0	0.0E+00	40	3.1E-03	0	0.0E+00	1.9E-03	0.0E+00
		EX-10328	EX-HV	274	24	4.5E-03	0	0.0E+00	38	2.8E-03	0	0.0E+00	1.7E-03	0.0E+00
	6	EX-10332	EX-HV	271	24	4.6E-03	0	0.0E+00	---	---	---	---	4.6E-03	0.0E+00
		EX-10334	EX-HV	257	24	4.8E-03	0	0.0E+00	---	---	---	---	4.8E-03	0.0E+00
	7	EX-10353	EX-HV	263	23	4.9E-03	0	0.0E+00	---	---	---	---	4.9E-03	0.0E+00
		EX-10355	EX-HV	253	24	4.9E-03	0	0.0E+00	---	---	---	---	4.9E-03	0.0E+00
	8	EX-10359	EX-HV	257	24	4.8E-03	0	0.0E+00	---	---	---	---	4.8E-03	0.0E+00
		EX-10361	EX-HV	259	23	5.0E-03	0	0.0E+00	---	---	---	---	5.0E-03	0.0E+00
	9	EX-10365	EX-HV	270	22	5.0E-03	0	0.0E+00	---	---	---	---	5.0E-03	0.0E+00
		EX-10366	EX-HV	263	23	4.9E-03	0	0.0E+00	---	---	---	---	4.9E-03	0.0E+00
	10	EX-10370	EX-HV	278	24	4.4E-03	0	0.0E+00	---	---	---	---	4.4E-03	0.0E+00
		EX-10371	EX-HV	271	13	8.4E-03	0	0.0E+00	---	---	---	---	8.4E-03	0.0E+00

Notes:

--- supplemental analysis was not completed

ABS - activity-based sampling
ID - identification
L - liter
GO - grid opening
cc - cubic centimeters
LA - Libby amphibole
PCME - phase contrast microscopy equivalent
Conc. - concentration
s/cc - structures per cubic centimeter

TABLE 8-2
2010 ABS ANALYSIS SUMMARY - SCENARIO 5 (TRAILER SAMPLES)
Libby Asbestos Superfund Site, Libby, Montana

Sector	Event	Sample ID	Filter Type	Sample Volume (L)	GOs Counted	Achieved Sensitivity $(cc)^{-1}$	PCME LA Structures	PCME LA Air Conc. (s/cc)
Sector A	1	EX-10262	EX-HV	384	8	9.6E-03	0	0.0E+00
	2	EX-10117	EX-HV	289	11	9.3E-03	0	0.0E+00
	3	EX-10105	EX-HV	352	9	9.3E-03	0	0.0E+00
	4	EX-10318	EX-HV	263	14	8.0E-03	0	0.0E+00
	5	EX-10306	EX-HV	253	14	8.4E-03	0	0.0E+00
	6	EX-10313	EX-HV	255	14	8.3E-03	0	0.0E+00
	7	EX-10387	EX-HV	270	13	8.4E-03	0	0.0E+00
	8	EX-10380	EX-HV	280	13	8.1E-03	0	0.0E+00
	9	EX-10390	EX-HV	276	13	8.3E-03	0	0.0E+00
	10	EX-10374	EX-HV	267	25	4.4E-03	0	0.0E+00
Sector B	1	EX-10098	EX-HV	352	17	4.9E-03	0	0.0E+00
	2	EX-10088	EX-HV	382	8	9.7E-03	0	0.0E+00
	3	EX-10267	EX-HV	372	8	1.0E-02	0	0.0E+00
	4	EX-10282	EX-HV	384	8	9.6E-03	0	0.0E+00
	5	EX-10277	EX-HV	276	11	9.8E-03	0	0.0E+00
	6	EX-10349	EX-HV	267	12	9.2E-03	0	0.0E+00
	7	EX-10343	EX-HV	267	12	9.2E-03	0	0.0E+00
	8	EX-10337	EX-HV	263	12	9.4E-03	0	0.0E+00
	9	EX-10402	EX-HV	261	14	8.1E-03	0	0.0E+00
	10	EX-10396	EX-HV	232	28	4.6E-03	0	0.0E+00
Sector C	1	EX-10300	EX-HV	246	13	9.3E-03	0	0.0E+00
	2	EX-10293	EX-HV	257	12	9.6E-03	0	0.0E+00
	3	EX-10289	EX-HV	265	12	9.3E-03	0	0.0E+00
	4	EX-10329	EX-HV	274	13	8.3E-03	0	0.0E+00
	5	EX-10333	EX-HV	276	14	7.7E-03	0	0.0E+00
	6	EX-10323	EX-HV	253	14	8.4E-03	0	0.0E+00
	7	EX-10364	EX-HV	276	11	9.8E-03	0	0.0E+00
	8	EX-10369	EX-HV	271	12	9.1E-03	0	0.0E+00
	9	EX-10360	EX-HV	250	12	9.9E-03	0	0.0E+00
	10	EX-10354	EX-HV	263	12	9.4E-03	0	0.0E+00

Notes:
ABS - activity-based sampling
ID - identification
L - liter
GO - grid opening
cc - cubic centimeters
LA - Libby amphibole
PCME - phase contrast microscopy equivalent
Conc. - concentration
s/cc - structures per cubic centimeter

TABLE 9-1
DATA QUALITY IMPACT ASSESSMENT FOR FIELD MODIFICATIONS
Libby Asbestos Superfund Site, Libby, Montana

ROM Number/ Effective Date	Description	Impact on Data Quality
LFO-000154/ JULY 13, 2010	The following revisions were made to the SAP text: • Definition of ABS Category 1 Residential Properties – In Section 3.7.1 of the SAP, a Category 1 property is defined as a residential property where no soil cleanup is required and with PLM-VE Bin B1 in all or a portion of the yard. This modification changes the definition of a Category 1 property to remove cleanup status as a criterion for selection. In other words, a Category 1 is defined as a residential property with PLM-VE Bin B1 in all or a portion of the yard. • Definition of ABS Category 4 Residential Properties – In Section 3.7.1 of the SAP, a Category 4 property is defined as a residential property where soil cleanup is required and with PLM-VE Bin B2 or Bin C in all or a portion of the yard. This modification changes the definition of a Category 4 property to remove cleanup status as a criterion for selection. In other words, a Category 4 is defined as a residential property with <1% or ≥1% (by either PLM-9002 or PLM-VE) in all or a portion of the yard. • Use of Historical Soil Data to Classify Residential Properties – For each candidate Category 1 and Category 4 residential property, a 30-point composite soil sample was collected from the yard as part of the pre-sampling effort. These yard soil samples were analyzed by PLM-VE. Results for these soil samples show that the PLM-VE results often differed from historical soil sample PLM results (e.g., Phase I, Contaminant Screening Study). Because no soil cleanup has been performed at these properties, the differences in reported soil levels are likely a consequence of sampling variability and the analytical method limitations of PLM, and not authentic changes in soil concentrations of LA. Therefore, the classification of residential properties into Category 1 and Category 4 will be based on historical soil sample PLM results (e.g., Phase I, Contaminant Screening Study). PLM-VE results for soil samples collected as part of Property Screening (see Section 4.2 of the SAP) will not be used to classify residential properties into these ABS Categories. Soil samples collected during Property Screening and prior to conducting ABS (see Section 4.3.1 of the SAP) will be used to establish the relationship between metrics of LA in soil and measured LA in ABS air.	None; modifications will not preclude the use of these data to establish the relationship between metrics of LA in soil and measured LA in ABS air.
LFO-000155/ JULY 9, 2010	The following revisions were made to the SAP text: • Figure 3-1 was modified to exclude OU5 to reflect the intent of the SAP. ABS activities described in this SAP are intended to be conducted primarily within OU4. • The sector names in Figure 3-2 were changed from 1,2 and 3 to A, B and C, respectively, to correspond to Table 4-1. The route for Sector A was altered to include an unpaved bike path along the southern end and to exclude a paved bridge crossing at the eastern end of the existing route. The route for Sector C was altered to minimize the number of highway crossings and maximize the coverage of residential areas in that section of town. Route changes were made to maximize the amount of time sampling activities were conducted over nonpaved routes, and to minimize health and safety issues. • In Section 3.7.1, the definition of Category 2 was revised to: "Category 2: Soil cleanup has occurred in the yard; no visible vermiculite present in the portion of the yard not affected by the removal action." • Any reference to gardens relating to Scenario 2 should be interpreted to include both flowerbeds and gardens and may include multiple areas meeting the same characteristics of contamination. • Scenario 2 is modified to remove rototilling. In lieu of rototilling, the digging activity was extended to 6 locations for 10 minutes each to account for the entire sampling period. Based on data collected during this event, EPA will determine if further sampling activities are required. If so, additional sampling will occur under future ABS activities. • Changes were made to Table 4-1 to reflect the correct number of Scenario 5 locations and events and to incorporate other modifications included in this attachment (i.e. no rototilling, 22 inch cassette height for tricycle)	No negative implications; changes will standardize analytical procedures for the ABS program.
LFO-000155/ JULY 9, 2010	• Section 4.2.2 was modified to include two modifications to CDM-LIBBY-06, Revision 1. 1) A minimum of 30 point inspections were conducted in each SUA. This modification is intended to reduce the likelihood of properties changing categories during ABS sampling. 2) No pre-screening inspection will be required for properties where previous ABS inspections meet the criteria outlined in Section 4.2.2. • Section 4.2.3 was modified to indicate that the percentage of yard utilized in Scenario 1 that have differing visual, PLM or removal characteristics was documented on property sketches instead of in field logbooks. • Section 4.3.1 was modified to indicate that soil samples would be collected and homogenized in accordance with CDM-LIBBY-05, Revision 2 with the following exceptions: Composite soil samples were collected regardless of the presence of visual vermiculite. Decontaminated sampling equipment were not wrapped in aluminum foil. All equipment was decontaminated before and after use. • Sections 4.3.1 and 4.4.2 were modified to indicate that the pre-sampling vegetative cover were documented on the ABS Property Background and Sampling Form instead of in field logbooks. • Section 4.3.2 was modified to indicate that no ABS air sampling would be conducted during a rain event. In addition, Scenarios 4 and 5 were not conducted when there was visible wetness on the road or bike path surface. • Section 4.3.2 was modified to indicate that instead of just the air sampling pump models identified in the SAP, a variety of pumps were used based on availability and ability to achieve target flow rates.	No negative implications; changes will standardize analytical procedures for the ABS program.

TABLE 9-1
DATA QUALITY IMPACT ASSESSMENT FOR FIELD MODIFICATIONS
Libby Asbestos Superfund Site, Libby, Montana

ROM Number/ Effective Date	Description	Impact on Data Quality
LFO-000155/ JULY 9, 2010	• Section 4.3.2 was modified to indicate that there is no specific number of required days between events instead of the minimum of 14 days between repetitions previously required.This modification enabled more flexibility in the scheduling of ABS sampling. The amount of time between events at a given property was maximized. However, this modification allowed for successive events to occur with less time between events if uncontrollable circumstances (e.g., weather/soil moisture) interfered with the overall schedule. • Appendix A Scenario 1 – Yard Work was revised as follows; …"The actor will utilize a long-handled shovel to remove soil from a 1-foot by 1-foot square area for 4.5 minutes.The soil will temporarily be staged on a tarp adjacent to the digging site.The actor will then kneel down and continue digging with a trowel for an additional 4.5 minutes. The depth attained in each digging location will be documented in the field logbook….". Reducing the size of area disturbed reduced damage to the yard. Splitting the activities by set time limits allowed the actor to spend time digging with a trowel even at properties where compaction limits the depth to which the actor can dig. • Appendix A, Scenario 5 – Biking was modified to inticate that the child carrier trailer was affixed to the back of one of the bicycles for entirety of the event - including both paved and unpaved portions of the path. • Appendix A, Scenario 3 was modified to indicate that during the tricycling portion, the air cassette was worn 22 inches above the ground to better represent a child's breathing zone while tricycling. The cassette was moved to the actor's right shoulder for the digging portion of Scenario 3 to simulate a child's breathing zone while seated and digging/playing. • Appendix A Scenario 4 –Driving/Road was clarified to indicate that the actor's travel would be evenly distributed throughout the bounded area across all 20 events. The bounded area is too large to cover within one event, so each event covered areas missed in previous events such that the sum of all 20 events comprehensively covered the entire bounded area. • Appendix C was modified to include a Property Background and Sampling Form. • Appendix E was modified to include a signed copy of the Summary of Preparation and Analytical Requirements for Asbestos to replace the unsigned copy that was originally in Appendix E of the SAP.	No negative implications; changes will standardize analytical procedures for the ABS program.
LFO-000157/ JULY 27, 2010	• During Event 1, only the back yard was sampled at Property AD-002501 due to confusion over the pre-screening sampling area. The team assumed the ABS sampling area to be the same as the pre-screening sampling area when the entire yard should have been sampled for ABS. Events 2 and 3 were conducted over the entire yard.	High bias; soil and air samples from Event 1 will be biased high because the sampling area was limited to the back yard where historic soil sample results came back Trace for LA.
LFO-000157/ JULY 28 and 29, 2010	• During the Scenario 2 events documented on the logbook pages listed above, the team dug 12 locations for 5 minutes each instead ofthe 6 locations for 10 minutes each documented in modification LFO-000155 to this SAP.	No negative implications; gardens sampled during these events will be better characterized due to the increased number of digging locations.
LFO-000157/ August 11, 2010	• The soil moisture meter appeared to be malfunctioning, giving different readings for the same location each time it was checked over a short period of time. To determine if the soil was sufficiently dry, the hand appearance method from Sampling and Analysis Plan for Activity Based Outdoor Air Exposures, Operable Unit 4, July 6, 2007 Section 4.2.2 was used.	No negative implications; soil moisture deficiency was estimated to be 75%, which puts the average moisture content below the required 30%.

Table 9-2
SOIL FIELD DUPLICATE RESULTS
Libby Asbestos Superfund Site, Libby, Montana

PANEL A: Soil Field Duplicate and Original Results

Sample Location	Sample Date	Original Soil Sample ID	PLM-VE Bin Result	Field Duplicate Sample ID	PLM-VE Bin Result
AD-000381	7/22/2010	EX-10168	B1	EX-10169	B1
AD-001731	7/28/2010	EX-10445	B1	EX-10449	B1
AD-001587	8/5/2010	EX-10559	A	EX-10560	A
AD-000258	8/9/2010	EX-10571	A	EX-10572	A
AD-003775	8/10/2010	EX-10687	A	EX-10694	A
AD-001865	8/25/2010	EX-10719	A	EX-10720	A
AD-002028	8/25/2010	EX-10923	B1	EX-10924	B1
AD-003052	8/30/2010	EX-11011	B1	EX-11012	A
AD-000262	9/8/2010	EX-11069	A	EX-11073	A
AD-003789	8/30/2010	EX-11090	A	EX-11091	A
AD-001815	9/8/2010	EX-11150	A	EX-11153	A
AD-002156	9/15/2010	EX-11267	A	EX-11271	B1
AD-002759	9/15/2010	EX-11292	A	EX-11298	A
AD-000258	9/27/2010	EX-11314	B1	EX-11317	B1

PANEL B: Comparison of Soil Field Duplicate Result to Original Result

		Field Duplicate Results			
		Bin A	**Bin B1**	**Bin B2**	**Bin C**
Original Results	**Bin A**	8	1	0	0
	Bin B1	1	4	0	0
	Bin B2	0	0	0	0
	Bin C	0	0	0	0

total number of duplicates	14	
number concordant	12	(grey shaded cells)
percent concordant	86%	

Notes:
ID - identification
PLM-VE - polarized light microscopy-visual estimation

TABLE 9-3
SAMPLE COMPLETENESS
Libby Asbestos Superfund Site, Libby, Montana

ABS Scenario	ABS Type	Type of Sample	Property Category	Number of Events	Number of Samples Analyzed per Event	Total number of requested results	Total number of valid results
1	Yard	Air	Category 1/Category 2/Category 3/Category 4	10/category	3	120	120
2	Garden	Air	VV - / VV +	10/category	3	60	60
3	Driveway	Air	VV - / VV +	10/category	3	60	60
4	Roads	Air	Paved/Unpaved	20	1	20	20
5	Trails	Air	Sector A/Sector B/Sector C	10	3[a]	90	90
					Total Air Samples	**350**	**350**
1	Yard	Soil	Category 1/Category 2/Category 3/Category 4	10/category	3	120	120
2	Garden	Soil	VV - / VV +	10/category	3	60	60
3	Driveway	Soil	VV - / VV +	10/category	3	60	60
					Total Soil Samples	**240**	**240**
					Total Air and Soil Samples	**590**	**590**
						% Complete	**100.0%**

[a]Includes 2 rider samples + 1 trailer sample

Notes:
ABS - activity-based sampling
VV - visible vermiculite

This page intentionally left blank to facilitate double-sided printing.

Data Summary Report
2010 Residential Activity-Based Sampling
Libby Asbestos Superfund Site, Montana

FIGURES

This page intentionally left blank to facilitate double-sided printing.

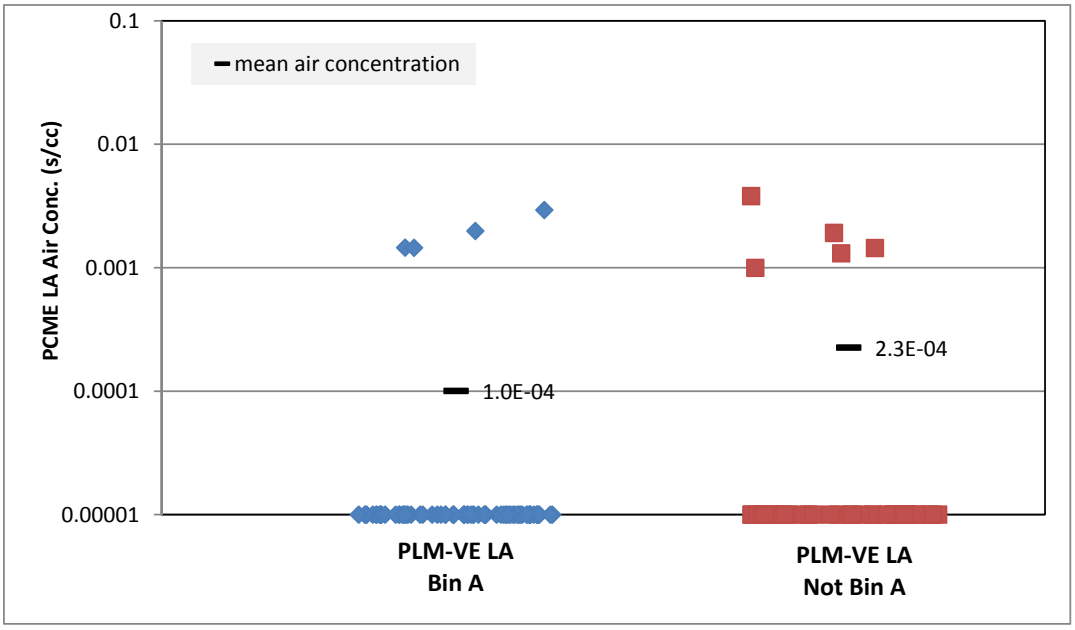
FIGURE 4-1. EXAMPLE PHOTOGRAPHS OF YARD ABS ACTIVITIES

Libby Asbestos Superfund Site, Libby, Montana

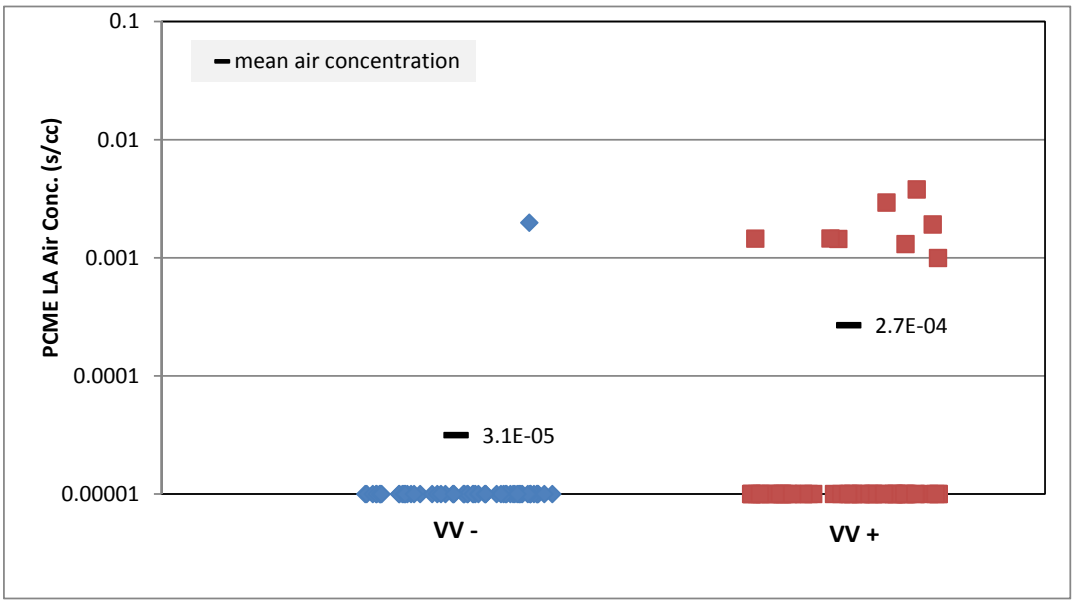
This page intentionally left blank to facilitate double-sided printing.

FIGURE 4-2
2010 ABS ANALYSIS SUMMARY - SCENARIO 1: WORKING IN RESIDENTIAL YARDS
Libby Asbestos Superfund Site, Libby, Montana

Panel A: Comparison to PLM-VE LA Bin



Panel B: Comparison to Visible Vermiculite Status



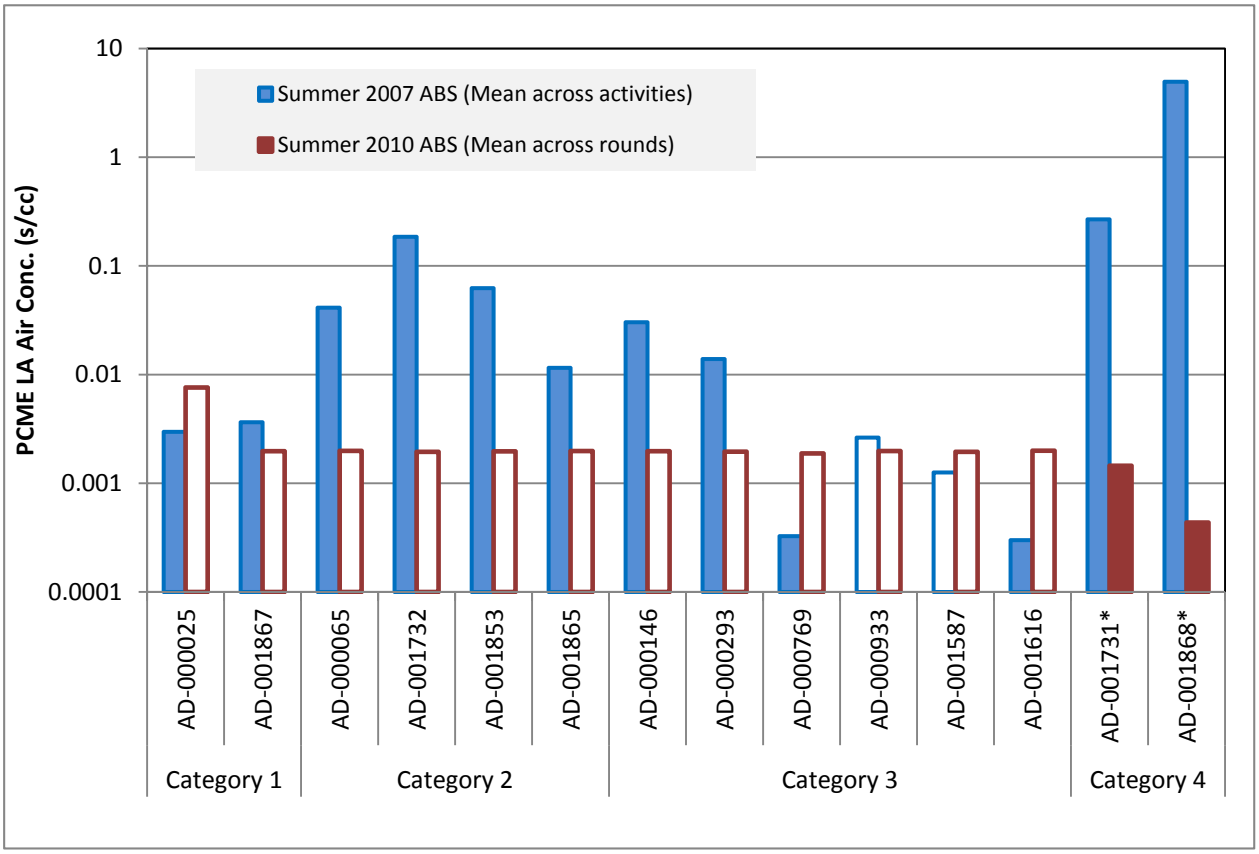
Notes:

For the purposes of plotting on a log-scale, non-detects are plotted at 1E-05 s/cc.
ABS - activity-based sampling
PLM-VE - polarized light microscopy - visual estimation
LA - Libby amphibole
PCME - phase contrast microscopy - equivalent
s/cc - structures per cubic centimeter
Conc. - concentration

This page intentionally left blank to facilitate double-sided printing.

FIGURE 4-3 COMPARISON OF 2007 AND 2010 ABS AIR CONCENTRATIONS

Libby Asbestos Superfund Site, Libby, Montana



* 2010 ABS results for this property reflect the pooled concentration (original + supplemental evaluation).

Open bars represent non-detects (displayed at the mean achieved sensitivity).

Category Descriptions:

Category 1 - no soil removal required; PLM Bin B1 in yard

Category 2 - soil removal complete; VV- in yard

Category 3 - soil removal complete; VV+ in yard

Category 4 - soil removal required; PLM Bin B2 or C in yard

Notes:

ABS - activity-based sampling

PCME - phase contrast microscopy - equivalent

LA - Libby amphibole

Conc. - concentration

s/cc - structures per cubic centimeter

VV - visible vermiculite

This page intentionally left blank to facilitate double-sided printing.

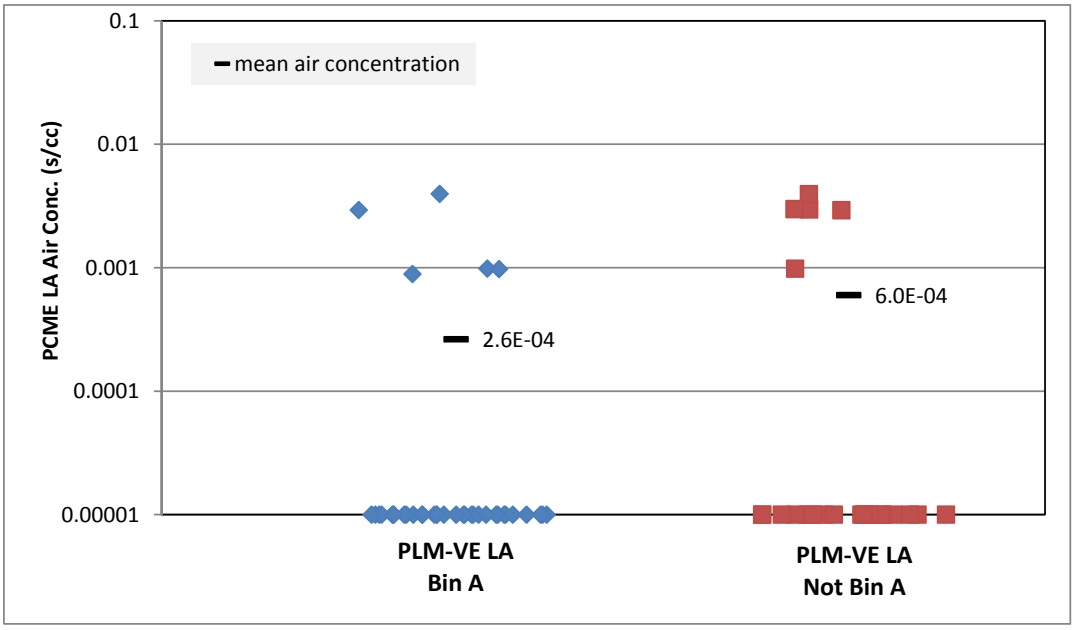
FIGURE 5-1. EXAMPLE PHOTOGRAPHS OF GARDEN ABS ACTIVITIES

Libby Asbestos Superfund Site, Libby, Montana

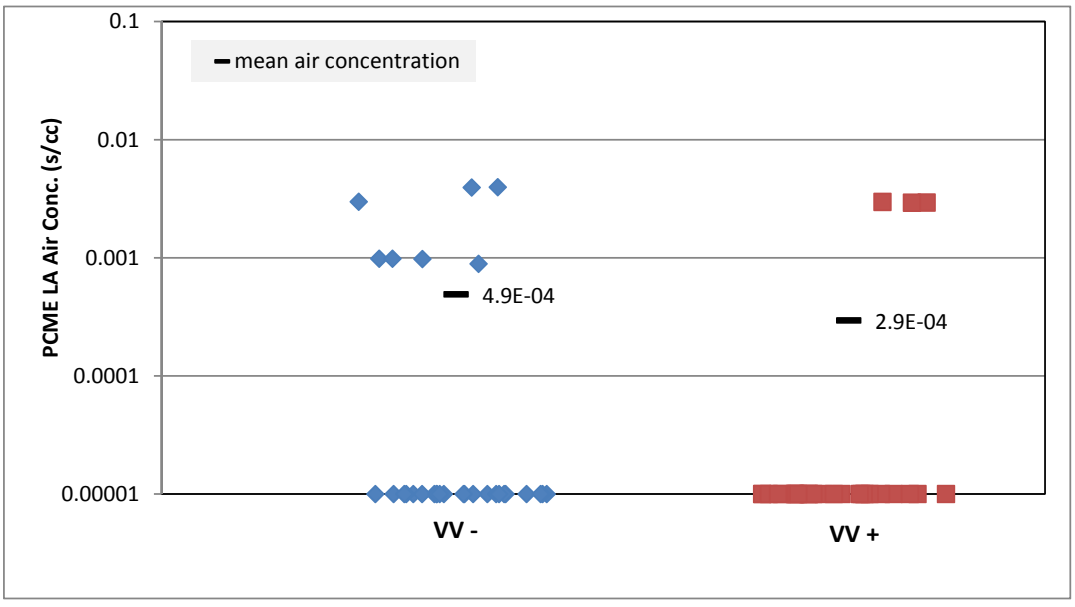
This page intentionally left blank to facilitate double-sided printing.

FIGURE 5-2
2010 ABS ANALYSIS SUMMARY - SCENARIO 2: DIGGING IN RESIDENTIAL GARDENS
Libby Asbestos Superfund Site, Libby, Montana

Panel A: Comparison to PLM-VE LA Bin



Panel B: Comparison to Visible Vermiculite Status



Notes:

For the purposes of plotting on a log-scale, non-detects are plotted at 1E-05 s/cc.
ABS - activity-based sampling
PLM-VE - polarized light microscopy - visual estimation
LA - Libby amphibole
PCME - phase contrast microscopy - equivalent
s/cc - structures per cubic centimeter
Conc. - concentration

This page intentionally left blank to facilitate double-sided printing.

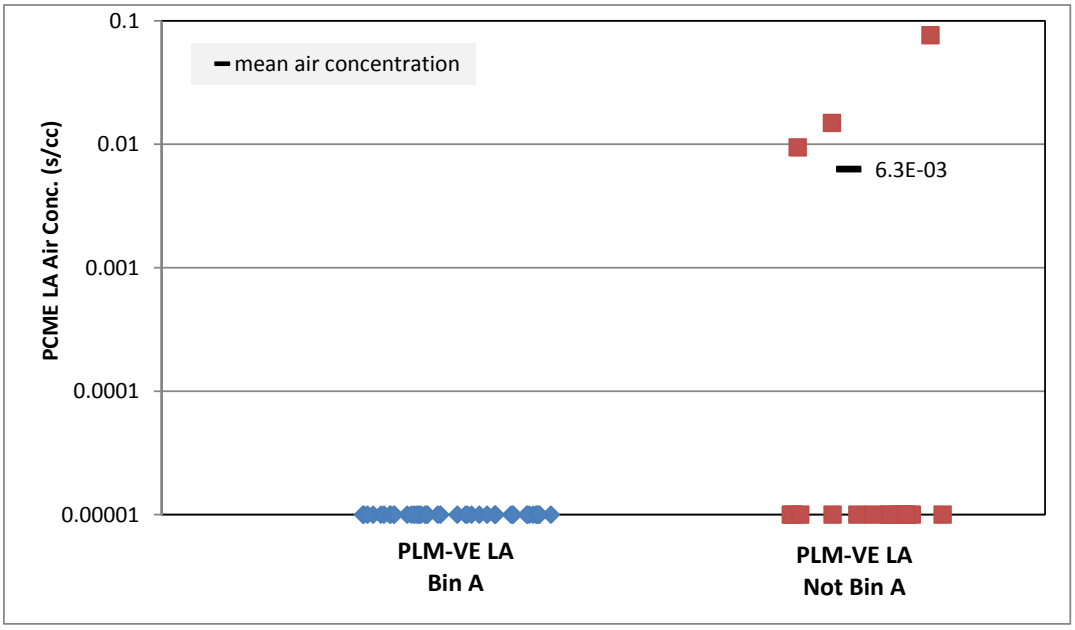
FIGURE 6-1. EXAMPLE PHOTOGRAPHS OF DRIVEWAY ABS ACTIVITIES

Libby Asbestos Superfund Site, Libby, Montana

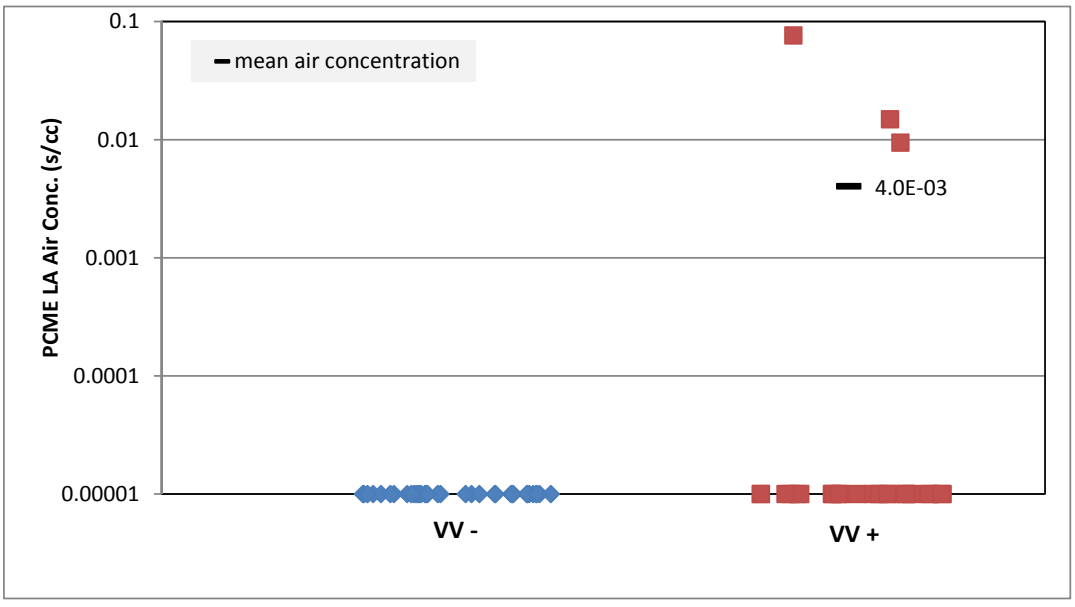
This page intentionally left blank to facilitate double-sided printing.

FIGURE 6-2
2010 ABS ANALYSIS SUMMARY - SCENARIO 3: PLAYING IN RESIDENTIAL DRIVEWAYS
Libby Asbestos Superfund Site, Libby, Montana

Panel A: Comparison to PLM-VE LA Bin



Panel B: Comparison to Visible Vermiculite Status



Notes:

For the purposes of plotting on a log-scale, non-detects are plotted at 1E-05 s/cc.
ABS - activity-based sampling
PLM-VE - polarized light microscopy - visual estimation
LA - Libby amphibole
PCME - phase contrast microscopy - equivalent
s/cc - structures per cubic centimeter
Conc. - concentration

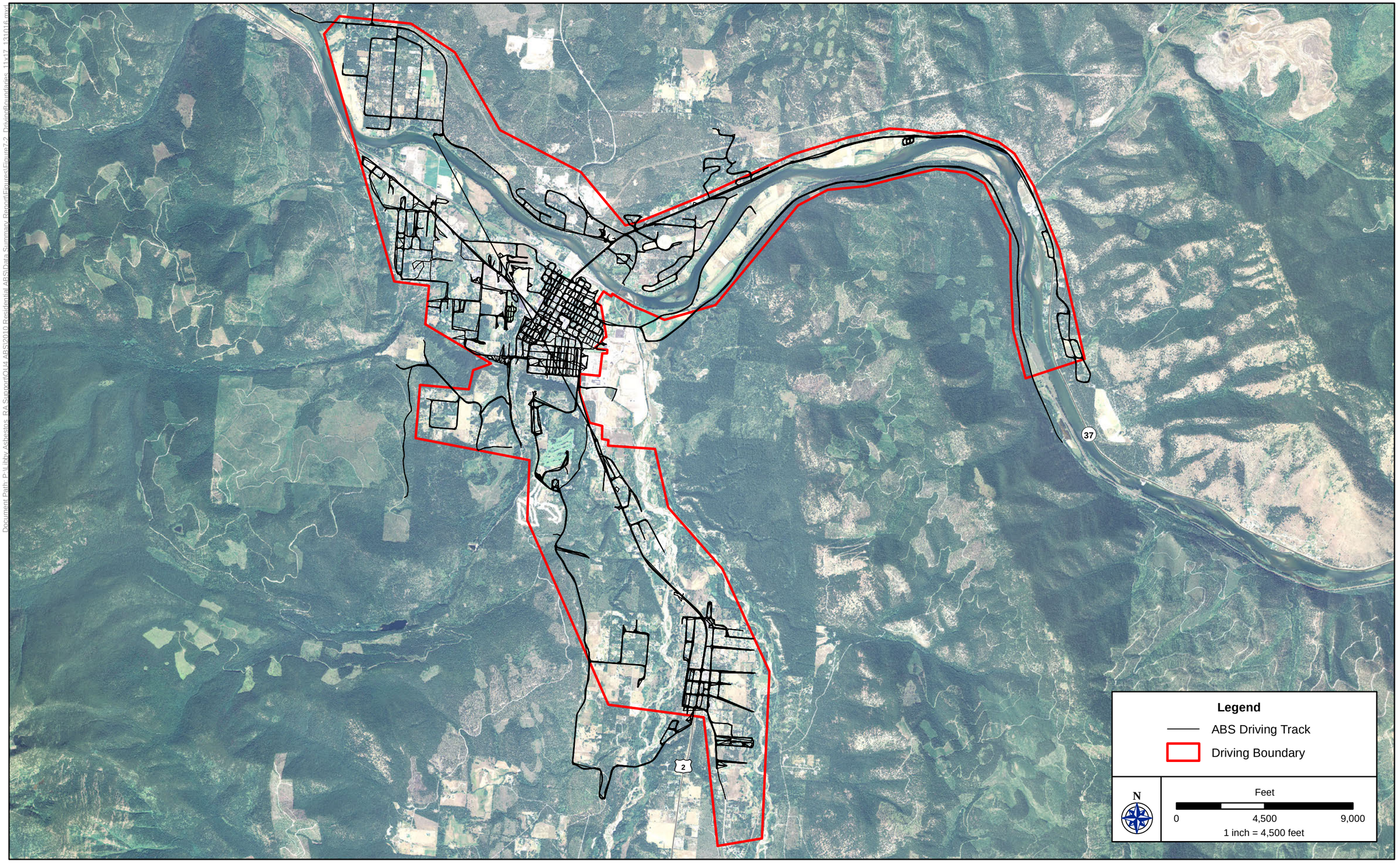
This page intentionally left blank to facilitate double-sided printing.

FIGURE 7-1 EXAMPLE PHOTOGRAPHS OF DRIVING ABS ACTIVITIES

Libby Asbestos Superfund Site, Libby, Montana

This page intentionally left blank to facilitate double-sided printing.

Document Path: P:\Libby Asbestos\RA Support\OU4 ABS\2010 Residential ABS\Data Summary Report\Figures\Figure 7-2_DrivingBoundaries_11x17_031016.mxd

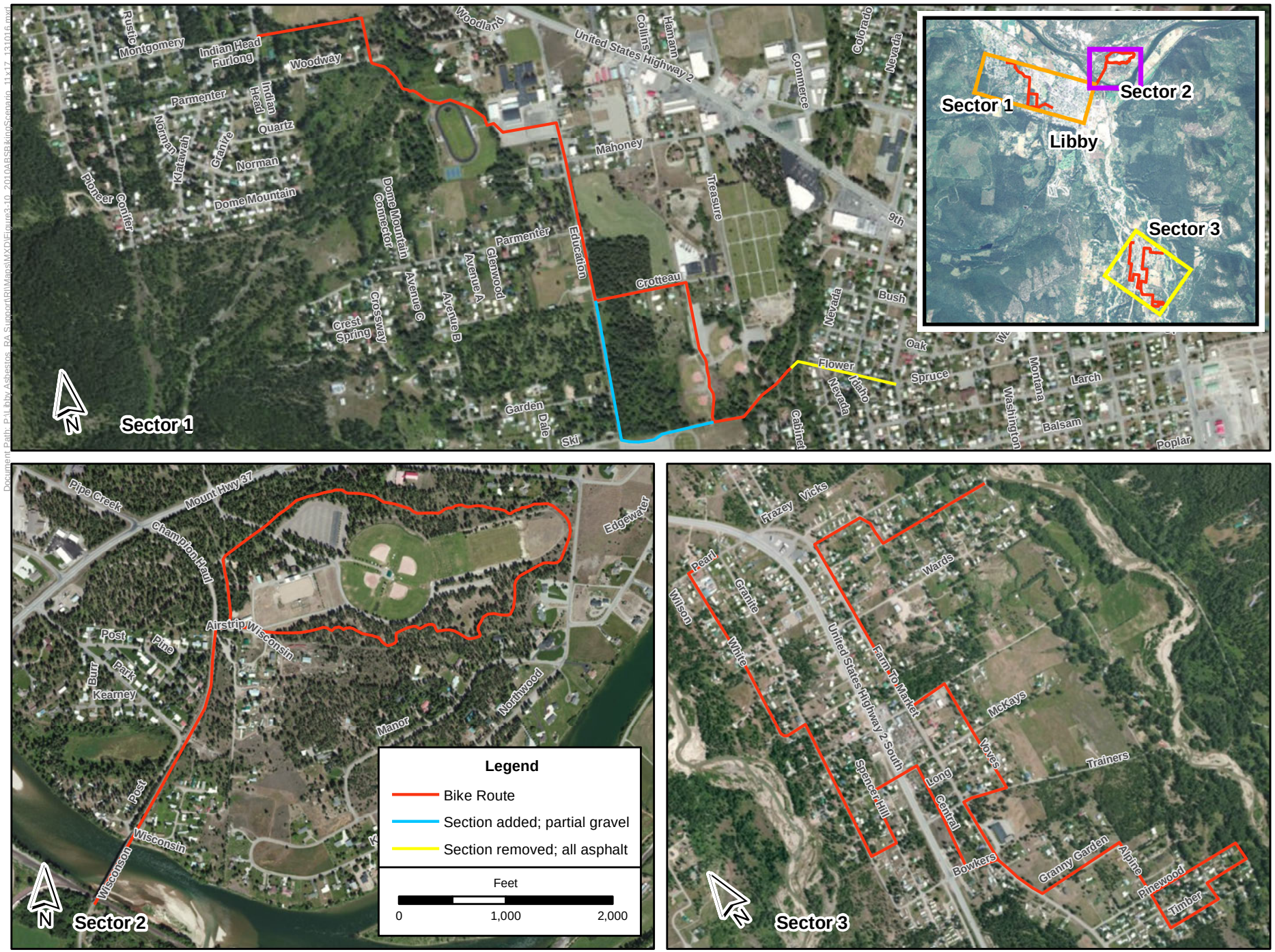


CDM Smith

Scenario 4
Driving Boundaries

FIGURE 7-2

This page intentionally left blank to facilitate double-sided printing.



Scenario 5
Bicycle Routes
FIGURE 8-1

CDM Smith

This page intentionally left blank to facilitate double-sided printing.

FIGURE 8-2. EXAMPLE PHOTOGRAPHS OF BIKING ABS ACTIVITIES

Libby Asbestos Superfund Site, Libby, Montana

This page intentionally left blank to facilitate double-sided printing.

Data Summary Report:
2010 Residential Activity-Based Sampling
Libby Asbestos Superfund Site, Operable Unit 4
Libby, Montana

APPENDICES

(available electronically upon request)

This page intentionally left blank to facilitate double-sided printing.

Data Summary Report:
2010 Residential Activity-Based Sampling
Libby Asbestos Superfund Site, Operable Unit 4
Libby, Montana

ATTACHMENT 1
Detailed Sample Information and Analysis Results

This page intentionally left blank to facilitate double-sided printing.

ATTACHMENT 1A. Description of Sampling Events

Scenario	Scenario Description	Activity
1	Working in Residential Yards	Digging/Mowing/Raking
2	Working in Residential Gardens	Digging/Mowing/Raking
3	Child Playing on Unpaved Driveway	Playing/Digging
4	Driving on Roads in Libby	Driving
5	Biking on Roads in Libby	Biking, Sector A (Rider)
		Biking, Sector A (Trailer)
		Biking, Sector B (Rider)
		Biking, Sector B (Trailer)
		Biking, Sector C (Rider)
		Biking, Sector C (Trailer)

Data Restrictions:

Only field samples are included; field quality control (QC) samples (e.g., field duplicates) are excluded.

Only laboratory "Not QC" analyses are included; laboratory QC analyses (e.g., laboratory duplicates) are excluded.

Results are presented for Libby amphibole (LA) only; chrysotile and other amphibole results are excluded.

This page intentionally left blank to facilitate double-sided printing.

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-000025	1	1	Digging/Mowing/Raking	EX-10609	Air	8/9/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	51	2.0E-03	0	0	0	0
AD-000025	1	2	Digging/Mowing/Raking	EX-10985	Air	8/27/2010	Field Sample	127	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	3/22/2011	4/4/2011	360	0.013	77	1.9E-02	0	0	0	0
AD-000025	1	3	Digging/Mowing/Raking	EX-11308	Air	9/16/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/20/2011	385	0.013	60	2.0E-03	0	0	0	0
AD-000065	1	1	Digging/Mowing/Raking	EX-10468	Air	7/30/2010	Field Sample	311	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/2/2010	385	0.013	48	2.0E-03	0	0	0	0
AD-000065	1	2	Digging/Mowing/Raking	EX-10895	Air	8/20/2010	Field Sample	305	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	49	2.0E-03	0	0	0	0
AD-000065	1	3	Digging/Mowing/Raking	EX-11194	Air	9/13/2010	Field Sample	244	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	61	2.0E-03	0	0	0	0
AD-000146	1	1	Digging/Mowing/Raking	EX-10070	Air	7/10/2010	Field Sample	358	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	42	2.0E-03	0	0	0	0
AD-000146	1	2	Digging/Mowing/Raking	EX-10232	Air	7/27/2010	Field Sample	274	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/1/2010	385	0.013	55	2.0E-03	0	0	0	0
AD-000146	1	3	Digging/Mowing/Raking	EX-10568	Air	8/5/2010	Field Sample	298	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/16/2010	385	0.013	50	2.0E-03	0	0	0	0
AD-000180	1	1	Digging/Mowing/Raking	EX-10258	Air	7/30/2010	Field Sample	286	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-000180	1	2	Digging/Mowing/Raking	EX-10870	Air	8/18/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-000180	1	3	Digging/Mowing/Raking	EX-11157	Air	9/8/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	11/1/2010	12/1/2010	385	0.013	77	3.0E-03	0	0	0	0
AD-000244	1	1	Digging/Mowing/Raking	EX-10083	Air	7/12/2010	Field Sample	338	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	44	2.0E-03	0	0	0	0
AD-000244	1	2	Digging/Mowing/Raking	EX-10729	Air	8/13/2010	Field Sample	254	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/10/2010	385	0.013	59	2.0E-03	0	0	0	0
AD-000244	1	3	Digging/Mowing/Raking	EX-11185	Air	9/10/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/11/2011	385	0.013	59	2.0E-03	0	0	0	0
AD-000258	1	1	Digging/Mowing/Raking	EX-10601	Air	8/7/2010	Field Sample	306	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	49	2.0E-03	0	0	0	0
AD-000258	1	1	Digging/Mowing/Raking	EX-10601	Air	8/7/2010	Field Sample	306	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/4/2013	385	0.013	150	6.5E-04	--	--	0	0
AD-000258	1	2	Digging/Mowing/Raking	EX-10938	Air	8/26/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-000258	1	2	Digging/Mowing/Raking	EX-10938	Air	8/26/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/10/2013	385	0.013	160	6.4E-04	--	--	3	1.9E-03
AD-000258	1	3	Digging/Mowing/Raking	EX-11315	Air	9/27/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/20/2011	385	0.013	58	2.0E-03	0	0	0	0
AD-000258	1	3	Digging/Mowing/Raking	EX-11315	Air	9/27/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/7/2013	385	0.013	172	6.6E-04	--	--	0	0
AD-000262	1	1	Digging/Mowing/Raking	EX-10732	Air	8/13/2010	Field Sample	240	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/10/2010	385	0.013	62	2.0E-03	0	0	0	0
AD-000262	1	1	Digging/Mowing/Raking	EX-10732	Air	8/13/2010	Field Sample	240	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/7/2013	385	0.013	190	6.5E-04	--	--	0	0
AD-000262	1	2	Digging/Mowing/Raking	EX-10905	Air	8/23/2010	Field Sample	314	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	48	2.0E-03	0	0	0	0
AD-000262	1	2	Digging/Mowing/Raking	EX-10905	Air	8/23/2010	Field Sample	314	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/9/2013	385	0.013	145	6.5E-04	--	--	0	0
AD-000262	1	3	Digging/Mowing/Raking	EX-11070	Air	9/8/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/3/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-000262	1	3	Digging/Mowing/Raking	EX-11070	Air	9/8/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/6/2013	385	0.013	160	6.4E-04	--	--	0	0
AD-000293	1	1	Digging/Mowing/Raking	EX-10408	Air	7/24/2010	Field Sample	316	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/3/2010	385	0.013	49	1.9E-03	0	0	0	0
AD-000293	1	2	Digging/Mowing/Raking	EX-10887	Air	8/20/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-000293	1	3	Digging/Mowing/Raking	EX-11401	Air	9/16/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/20/2011	385	0.013	52	2.0E-03	0	0	0	0
AD-000381	1	1	Digging/Mowing/Raking	EX-10647	Air	8/12/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	55	1.9E-03	0	0	0	0
AD-000381	1	1	Digging/Mowing/Raking	EX-10647	Air	8/12/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/7/2013	385	0.013	165	6.4E-04	--	--	0	0
AD-000381	1	2	Digging/Mowing/Raking	EX-11020	Air	8/31/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	35	2.9E-03	0	0	0	0
AD-000381	1	2	Digging/Mowing/Raking	EX-11020	Air	8/31/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/11/2013	385	0.013	181	5.7E-04	--	--	0	0
AD-000381	1	3	Digging/Mowing/Raking	EX-11237	Air	9/13/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/24/2011	385	0.013	35	2.9E-03	0	0	0	0
AD-000381	1	3	Digging/Mowing/Raking	EX-11237	Air	9/13/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/8/2013	385	0.013	175	5.9E-04	--	--	0	0
AD-000415	1	1	Digging/Mowing/Raking	EX-10614	Air	8/9/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	51	2.0E-03	0	0	0	0
AD-000415	1	1	Digging/Mowing/Raking	EX-10614	Air	8/9/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/4/2013	385	0.013	155	6.5E-04	--	--	0	0
AD-000415	1	2	Digging/Mowing/Raking	EX-11031	Air	9/2/2010	Field Sample	301	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/1/2010	385	0.013	50	2.0E-03	0	0	0	0
AD-000415	1	2	Digging/Mowing/Raking	EX-11031	Air	9/2/2010	Field Sample	301	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/14/2013	385	0.013	160	6.1E-04	--	--	0	0
AD-000415	1	3	Digging/Mowing/Raking	EX-11304	Air	9/16/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/20/2011	385	0.013	59	2.0E-03	0	0	0	0
AD-000415	1	3	Digging/Mowing/Raking	EX-11304	Air	9/16/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/8/2013	385	0.013	178	6.6E-04	--	--	0	0
AD-000444	1	1	Digging/Mowing/Raking	EX-10212	Air	7/26/2010	Field Sample	135	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/7/2010	385	0.013	110	2.0E-03	0	0	0	0
AD-000444	1	2	Digging/Mowing/Raking	EX-10498	Air	8/3/2010	Field Sample	321	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	47	2.0E-03	0	0	0	0
AD-000444	1	3	Digging/Mowing/Raking	EX-11111	Air	9/2/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/3/2010	385	0.013	59	2.0E-03	0	0	0	0
AD-000769	1	1	Digging/Mowing/Raking	EX-10485	Air	8/2/2010	Field Sample	300	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	9/30/2010	385	0.013	50	2.0E-03	0	0	0	0
AD-000769	1	2	Digging/Mowing/Raking	EX-10881	Air	8/19/2010	Field Sample	309	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	10/1/2010	385	0.013	48	2.0E-03	0	0	0	0
AD-000769	1	3	Digging/Mowing/Raking	EX-11115	Air	9/2/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/3/2010	385	0.013	68	1.7E-03	0	0	0	0
AD-000785	1	1	Digging/Mowing/Raking	EX-10595	Air	8/11/2010	Field Sample	272	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/16/2010	385	0.013	55	2.0E-03	0	0	0	0
AD-000785	1	1	Digging/Mowing/Raking	EX-10595	Air	8/11/2010	Field Sample	272	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/4/2013	385	0.013	170	6.4E-04	--	--	0	0
AD-000785	1	2	Digging/Mowing/Raking	EX-10776	Air	8/19/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/10/2010	385	0.013	59	2.0E-03	0	0	0	0
AD-000785	1	2	Digging/Mowing/Raking	EX-10776	Air	8/19/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/8/2013	385	0.013	182	6.4E-04	--	--	3	1.9E-03
AD-000785	1	3	Digging/Mowing/Raking	EX-11079	Air	9/8/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/3/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-000785	1	3	Digging/Mowing/Raking	EX-11079	Air	9/8/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/7/2013	385	0.013	160	6.5E-04	--	--	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-000933	1	1	Digging/Mowing/Raking	EX-10552	Air	8/4/2010	Field Sample	285	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/16/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-000933	1	2	Digging/Mowing/Raking	EX-10711	Air	8/23/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/21/2010	385	0.013	59	2.0E-03	0	0	0	0
AD-000933	1	3	Digging/Mowing/Raking	EX-11167	Air	9/9/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/4/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-001511	1	1	Digging/Mowing/Raking	EX-10241	Air	7/28/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-001511	1	2	Digging/Mowing/Raking	EX-10588	Air	8/11/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/16/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-001511	1	3	Digging/Mowing/Raking	EX-11136	Air	9/3/2010	Field Sample	254	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/4/2010	385	0.013	60	1.9E-03	0	0	0	0
AD-001587	1	1	Digging/Mowing/Raking	EX-10418	Air	7/24/2010	Field Sample	316	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/3/2010	385	0.013	50	1.9E-03	0	0	0	0
AD-001587	1	2	Digging/Mowing/Raking	EX-10561	Air	8/5/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/16/2010	385	0.013	51	2.0E-03	0	0	0	0
AD-001587	1	3	Digging/Mowing/Raking	EX-11121	Air	9/2/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/3/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-001616	1	1	Digging/Mowing/Raking	EX-10224	Air	7/27/2010	Field Sample	285	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/1/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-001616	1	2	Digging/Mowing/Raking	EX-10591	Air	8/11/2010	Field Sample	285	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/16/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-001616	1	3	Digging/Mowing/Raking	EX-11281	Air	9/13/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/20/2011	385	0.013	59	2.0E-03	0	0	0	0
AD-001628	1	1	Digging/Mowing/Raking	EX-10228	Air	7/27/2010	Field Sample	274	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/1/2010	385	0.013	55	2.0E-03	0	0	0	0
AD-001628	1	2	Digging/Mowing/Raking	EX-10980	Air	8/26/2010	Field Sample	246	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	66	1.8E-03	0	0	0	0
AD-001628	1	3	Digging/Mowing/Raking	EX-11273	Air	9/16/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/13/2011	385	0.013	52	2.0E-03	0	0	0	0
AD-001631	1	1	Digging/Mowing/Raking	EX-10517	Air	8/5/2010	Field Sample	314	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	48	2.0E-03	0	0	0	0
AD-001631	1	2	Digging/Mowing/Raking	EX-10744	Air	8/17/2010	Field Sample	246	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/10/2010	385	0.013	61	2.0E-03	0	0	0	0
AD-001631	1	3	Digging/Mowing/Raking	EX-10952	Air	8/28/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-001731	1	1	Digging/Mowing/Raking	EX-10454	Air	7/28/2010	Field Sample	296	TEM-ISO	EMSL27	NOT QC	Direct	4/26/2013	4/30/2013	385	0.013	219	4.6E-04	--	--	3	1.4E-03
AD-001731	1	2	Digging/Mowing/Raking	EX-10531	Air	8/2/2010	Field Sample	135	TEM-ISO	EMSL27	NOT QC	Direct	4/26/2013	5/14/2013	385	0.013	458	4.8E-04	--	--	4	1.9E-03
AD-001731	1	3	Digging/Mowing/Raking	EX-11262	Air	9/15/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/13/2011	385	0.013	52	2.0E-03	0	0	0	0
AD-001731	1	3	Digging/Mowing/Raking	EX-11262	Air	9/15/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/11/2013	385	0.013	154	6.7E-04	--	--	2	1.3E-03
AD-001732	1	1	Digging/Mowing/Raking	EX-10431	Air	7/26/2010	Field Sample	300	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/7/2010	385	0.013	52	1.9E-03	0	0	0	0
AD-001732	1	2	Digging/Mowing/Raking	EX-10635	Air	8/11/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-001732	1	3	Digging/Mowing/Raking	EX-11050	Air	9/3/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/1/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-001815	1	1	Digging/Mowing/Raking	EX-11107	Air	8/31/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-001815	1	2	Digging/Mowing/Raking	EX-11151	Air	9/8/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/4/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-001815	1	3	Digging/Mowing/Raking	EX-11277	Air	9/16/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/20/2011	385	0.013	77	1.3E-03	0	0	0	0
AD-001853	1	1	Digging/Mowing/Raking	EX-10009	Air	7/9/2010	Field Sample	344	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	44	2.0E-03	0	0	0	0
AD-001853	1	2	Digging/Mowing/Raking	EX-10521	Air	7/30/2010	Field Sample	283	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-001853	1	3	Digging/Mowing/Raking	EX-10736	Air	8/16/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/10/2010	385	0.013	58	2.0E-03	0	0	0	0
AD-001865	1	1	Digging/Mowing/Raking	EX-10076	Air	7/12/2010	Field Sample	345	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	43	2.0E-03	0	0	0	0
AD-001865	1	2	Digging/Mowing/Raking	EX-10490	Air	8/2/2010	Field Sample	301	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	50	2.0E-03	0	0	0	0
AD-001865	1	3	Digging/Mowing/Raking	EX-10961	Air	8/25/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	59	2.0E-03	0	0	0	0
AD-001867	1	1	Digging/Mowing/Raking	EX-10494	Air	8/3/2010	Field Sample	311	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	48	2.0E-03	0	0	0	0
AD-001867	1	2	Digging/Mowing/Raking	EX-10696	Air	8/12/2010	Field Sample	242	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/21/2010	385	0.013	62	2.0E-03	0	0	0	0
AD-001867	1	3	Digging/Mowing/Raking	EX-10945	Air	8/27/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-001868	1	1	Digging/Mowing/Raking	EX-10541	Air	8/3/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/9/2010	385	0.013	115	2.0E-03	0	0	0	0
AD-001868	1	1	Digging/Mowing/Raking	EX-10541	Air	8/3/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/18/2013	385	0.013	350	6.6E-04	--	--	0	0
AD-001868	1	2	Digging/Mowing/Raking	EX-10865	Air	8/17/2010	Field Sample	305	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	49	2.0E-03	0	0	0	0
AD-001868	1	2	Digging/Mowing/Raking	EX-10865	Air	8/17/2010	Field Sample	305	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/8/2013	385	0.013	174	5.6E-04	--	--	3	1.7E-03
AD-001868	1	3	Digging/Mowing/Raking	EX-11129	Air	9/3/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/3/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-001868	1	3	Digging/Mowing/Raking	EX-11129	Air	9/3/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/7/2013	385	0.013	190	6.2E-04	--	--	0	0
AD-001991	1	1	Digging/Mowing/Raking	EX-10761	Air	8/18/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	9/30/2010	385	0.013	77	3.0E-03	0	0	0	0
AD-001991	1	2	Digging/Mowing/Raking	EX-11000	Air	8/28/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	9/16/2010	9/23/2010	385	0.013	77	3.0E-03	0	0	0	0
AD-001991	1	3	Digging/Mowing/Raking	EX-11058	Air	9/7/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/1/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-002028	1	1	Digging/Mowing/Raking	EX-10502	Air	8/4/2010	Field Sample	311	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	48	2.0E-03	0	0	0	0
AD-002028	1	1	Digging/Mowing/Raking	EX-10502	Air	8/4/2010	Field Sample	311	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/4/2013	385	0.013	150	6.3E-04	--	--	0	0
AD-002028	1	2	Digging/Mowing/Raking	EX-10928	Air	8/25/2010	Field Sample	300	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	50	2.0E-03	0	0	0	0
AD-002028	1	2	Digging/Mowing/Raking	EX-10928	Air	8/25/2010	Field Sample	300	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/10/2013	385	0.013	158	6.2E-04	--	--	8	5.0E-03
AD-002028	1	3	Digging/Mowing/Raking	EX-11255	Air	9/14/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/12/2011	385	0.013	52	2.0E-03	0	0	0	0
AD-002028	1	3	Digging/Mowing/Raking	EX-11255	Air	9/14/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/8/2013	385	0.013	160	6.4E-04	--	--	0	0
AD-002032	1	1	Digging/Mowing/Raking	EX-10756	Air	8/18/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/4/2010	360	0.013	77	5.6E-03	0	0	0	0
AD-002032	1	2	Digging/Mowing/Raking	EX-10995	Air	8/28/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	60	2.0E-03	0	0	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-002032	1	3	Digging/Mowing/Raking	EX-11062	Air	9/7/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/1/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-002041	1	1	Digging/Mowing/Raking	EX-10210	Air	7/24/2010	Field Sample	286	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-002041	1	2	Digging/Mowing/Raking	EX-10965	Air	8/25/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	69	1.7E-03	0	0	0	0
AD-002041	1	3	Digging/Mowing/Raking	EX-11171	Air	9/10/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/4/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-002501	1	1	Digging/Mowing/Raking	EX-10442	Air	7/27/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/8/2010	385	0.013	55	1.9E-03	0	0	0	0
AD-002501	1	2	Digging/Mowing/Raking	EX-10684	Air	8/10/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/21/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-002501	1	3	Digging/Mowing/Raking	EX-11405	Air	9/16/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/20/2011	385	0.013	52	2.0E-03	0	0	0	0
AD-002515	1	1	Digging/Mowing/Raking	EX-10606	Air	8/7/2010	Field Sample	292	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	51	2.0E-03	0	0	0	0
AD-002515	1	2	Digging/Mowing/Raking	EX-10912	Air	8/24/2010	Field Sample	309	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	48	2.0E-03	0	0	0	0
AD-002515	1	3	Digging/Mowing/Raking	EX-11210	Air	9/9/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/11/2011	385	0.013	52	2.0E-03	0	0	0	0
AD-002564	1	1	Digging/Mowing/Raking	EX-10652	Air	8/12/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-002564	1	2	Digging/Mowing/Raking	EX-10768	Air	8/19/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/4/2010	360	0.013	77	9.5E-03	0	0	0	0
AD-002564	1	3	Digging/Mowing/Raking	EX-11034	Air	9/2/2010	Field Sample	301	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/1/2010	385	0.013	50	2.0E-03	0	0	0	0
AD-002632	1	1	Digging/Mowing/Raking	EX-10707	Air	8/23/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/21/2010	385	0.013	59	2.0E-03	0	0	0	0
AD-002632	1	2	Digging/Mowing/Raking	EX-11023	Air	9/2/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/1/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-002632	1	3	Digging/Mowing/Raking	EX-11220	Air	9/10/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/12/2011	385	0.013	52	2.0E-03	0	0	0	0
AD-002697	1	1	Digging/Mowing/Raking	EX-10659	Air	8/13/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/21/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-002697	1	2	Digging/Mowing/Raking	EX-10780	Air	8/20/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	10/1/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-002697	1	3	Digging/Mowing/Raking	EX-11087	Air	8/30/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	65	1.8E-03	0	0	0	0
AD-002990	1	1	Digging/Mowing/Raking	EX-10741	Air	8/16/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	11/1/2010	12/1/2010	385	0.013	77	3.0E-03	0	0	0	0
AD-002990	1	1	Digging/Mowing/Raking	EX-10741	Air	8/16/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/7/2013	385	0.013	385	6.0E-04	--	--	0	0
AD-002990	1	2	Digging/Mowing/Raking	EX-10957	Air	8/28/2010	Field Sample	123	TEM-ISO	EMSL27	NOT QC	Direct	3/4/2011	3/7/2011	385	0.013	77	3.1E-03	0	0	0	0
AD-002990	1	2	Digging/Mowing/Raking	EX-10957	Air	8/28/2010	Field Sample	123	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/11/2013	385	0.013	415	5.8E-04	--	--	6	3.5E-03
AD-002990	1	3	Digging/Mowing/Raking	EX-11178	Air	9/10/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/11/2011	385	0.013	60	2.0E-03	0	0	0	0
AD-002990	1	3	Digging/Mowing/Raking	EX-11178	Air	9/10/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/8/2013	385	0.013	183	6.5E-04	--	--	0	0
AD-003052	1	1	Digging/Mowing/Raking	EX-10435	Air	7/27/2010	Field Sample	131	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/8/2010	385	0.013	114	2.0E-03	2	4.0E-03	1	2.0E-03
AD-003052	1	2	Digging/Mowing/Raking	EX-10671	Air	8/16/2010	Field Sample	286	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/21/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-003052	1	3	Digging/Mowing/Raking	EX-11013	Air	8/30/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	35	2.9E-03	0	0	0	0
AD-003226	1	1	Digging/Mowing/Raking	EX-10877	Air	8/19/2010	Field Sample	119	TEM-ISO	EMSL27	NOT QC	Direct	9/16/2010	9/23/2010	385	0.013	83	3.0E-03	0	0	0	0
AD-003226	1	2	Digging/Mowing/Raking	EX-11001	Air	8/28/2010	Field Sample	123	TEM-ISO	EMSL27	NOT QC	Direct	3/4/2011	3/7/2011	385	0.013	77	3.1E-03	0	0	0	0
AD-003226	1	3	Digging/Mowing/Raking	EX-11140	Air	9/7/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/4/2010	385	0.013	60	2.0E-03	0	0	0	0
AD-003226	1	3	Digging/Mowing/Raking	EX-11141	Air	9/7/2010	Field Sample	127	TEM-ISO	EMSL27	NOT QC	Direct	9/16/2010	9/23/2010	385	0.013	78	3.0E-03	0	0	0	0
AD-003995	1	1	Digging/Mowing/Raking	EX-10639	Air	8/11/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/20/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-003995	1	2	Digging/Mowing/Raking	EX-10916	Air	8/24/2010	Field Sample	296	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	51	2.0E-03	0	0	0	0
AD-003995	1	3	Digging/Mowing/Raking	EX-11066	Air	9/7/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	11/3/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-004362	1	1	Digging/Mowing/Raking	EX-10620	Air	8/10/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	9/30/2010	385	0.013	51	2.0E-03	0	0	0	0
AD-004362	1	1	Digging/Mowing/Raking	EX-10620	Air	8/10/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	1/4/2013	1/7/2013	385	0.013	155	6.5E-04	--	--	0	0
AD-004362	1	2	Digging/Mowing/Raking	EX-10902	Air	8/23/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/11/2010	385	0.013	53	1.9E-03	0	0	0	0
AD-004362	1	2	Digging/Mowing/Raking	EX-10902	Air	8/23/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	1/7/2013	1/9/2013	385	0.013	160	6.4E-04	--	--	0	0
AD-004362	1	3	Digging/Mowing/Raking	EX-11217	Air	9/10/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/11/2011	385	0.013	53	2.0E-03	0	0	0	0
AD-004362	1	3	Digging/Mowing/Raking	EX-11217	Air	9/10/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	3/5/2013	3/8/2013	385	0.013	160	6.5E-04	--	--	0	0
AD-000117	2	1	Digging	EX-10631	Air	8/11/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-000117	2	1	Digging	EX-10631	Air	8/11/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/10/2013	385	0.013	53	2.0E-03	--	--	1	2.0E-03
AD-000117	2	2	Digging	EX-10941	Air	8/27/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	35	2.9E-03	0	0	0	0
AD-000117	2	2	Digging	EX-10941	Air	8/27/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/21/2013	385	0.013	70	1.5E-03	--	--	1	1.5E-03
AD-000117	2	3	Digging	EX-11046	Air	9/3/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/10/2011	385	0.013	35	3.0E-03	0	0	0	0
AD-000117	2	3	Digging	EX-11046	Air	9/3/2010	Field Sample	284	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/11/2013	385	0.013	70	1.5E-03	--	--	0	0
AD-000126	2	1	Digging	EX-10580	Air	8/9/2010	Field Sample	285	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	52	2.0E-03	0	0	0	0
AD-000126	2	2	Digging	EX-10973	Air	8/26/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	40	3.0E-03	0	0	0	0
AD-000126	2	3	Digging	EX-11224	Air	9/10/2010	Field Sample	284	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/24/2011	385	0.013	35	3.0E-03	1	3.0E-03	0	0
AD-000258	2	1	Digging	EX-10573	Air	8/9/2010	Field Sample	322	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	46	2.0E-03	0	0	0	0
AD-000258	2	2	Digging	EX-10935	Air	8/26/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	34	3.0E-03	0	0	0	0
AD-000258	2	3	Digging	EX-11312	Air	9/27/2010	Field Sample	257	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/27/2011	385	0.013	39	3.0E-03	0	0	0	0
AD-000381	2	1	Digging	EX-10645	Air	8/12/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	52	2.0E-03	0	0	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-000381	2	1	Digging	EX-10645	Air	8/12/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/10/2013	385	0.013	52	2.0E-03	--	--	1	2.0E-03
AD-000381	2	2	Digging	EX-11016	Air	8/31/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	35	2.9E-03	1	2.9E-03	1	2.9E-03
AD-000381	2	2	Digging	EX-11016	Air	8/31/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/21/2013	385	0.013	69	1.5E-03	--	--	3	4.5E-03
AD-000381	2	3	Digging	EX-11233	Air	9/13/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/24/2011	385	0.013	35	2.9E-03	0	0	0	0
AD-000381	2	3	Digging	EX-11233	Air	9/13/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/18/2013	385	0.013	68	1.5E-03	--	--	3	4.5E-03
AD-000415	2	1	Digging	EX-10617	Air	8/9/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-000415	2	2	Digging	EX-11027	Air	9/2/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/10/2011	385	0.013	34	3.0E-03	0	0	0	0
AD-000415	2	3	Digging	EX-11301	Air	9/16/2010	Field Sample	259	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/26/2011	385	0.013	39	2.9E-03	1	2.9E-03	1	2.9E-03
AD-000553	2	1	Digging	EX-10556	Air	8/4/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	34	3.0E-03	0	0	0	0
AD-000553	2	2	Digging	EX-10715	Air	8/23/2010	Field Sample	254	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	39	3.0E-03	0	0	0	0
AD-000553	2	3	Digging	EX-11244	Air	9/13/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/25/2011	385	0.013	35	2.9E-03	1	2.9E-03	1	2.9E-03
AD-000785	2	1	Digging	EX-10514	Air	8/5/2010	Field Sample	123	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/9/2010	385	0.013	81	3.0E-03	1	3.0E-03	1	3.0E-03
AD-000785	2	2	Digging	EX-10773	Air	8/19/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	10/18/2010	10/26/2010	385	0.013	77	3.0E-03	0	0	0	0
AD-000785	2	3	Digging	EX-11075	Air	9/8/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/10/2011	385	0.013	35	3.0E-03	0	0	0	0
AD-001511	2	1	Digging	EX-10236	Air	7/28/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/1/2010	385	0.013	35	2.9E-03	0	0	0	0
AD-001511	2	1	Digging	EX-10236	Air	7/28/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/9/2013	385	0.013	68	1.5E-03	--	--	0	0
AD-001511	2	2	Digging	EX-10585	Air	8/11/2010	Field Sample	127	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	3/22/2011	4/4/2011	360	0.013	77	1.1E-02	0	0	0	0
AD-001511	2	2	Digging	EX-10585	Air	8/11/2010	Field Sample	127	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	1/17/2013	1/18/2013	360	0.013	795	1.1E-03	--	--	0	0
AD-001511	2	3	Digging	EX-11133	Air	9/3/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/10/2011	385	0.013	40	2.9E-03	0	0	0	0
AD-001511	2	3	Digging	EX-11133	Air	9/3/2010	Field Sample	253	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/12/2013	385	0.013	78	1.5E-03	--	--	0	0
AD-001644	2	1	Digging	EX-10764	Air	8/18/2010	Field Sample	242	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	41	3.0E-03	0	0	0	0
AD-001644	2	2	Digging	EX-11083	Air	8/28/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/7/2010	360	0.013	77	5.7E-03	0	0	0	0
AD-001644	2	3	Digging	EX-11163	Air	9/8/2010	Field Sample	253	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/21/2011	385	0.013	40	2.9E-03	0	0	0	0
AD-001731	2	1	Digging	EX-10447	Air	7/28/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/8/2010	385	0.013	37	2.7E-03	0	0	0	0
AD-001731	2	2	Digging	EX-10533	Air	8/2/2010	Field Sample	299	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	50	2.0E-03	0	0	0	0
AD-001731	2	3	Digging	EX-11265	Air	9/15/2010	Field Sample	284	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/26/2011	385	0.013	35	3.0E-03	0	0	0	0
AD-001864	2	1	Digging	EX-10679	Air	8/17/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	34	3.0E-03	0	0	0	0
AD-001864	2	1	Digging	EX-10679	Air	8/17/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/10/2013	385	0.013	68	1.5E-03	--	--	0	0
AD-001864	2	2	Digging	EX-11038	Air	9/2/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	1/10/2011	385	0.013	34	3.0E-03	0	0	0	0
AD-001864	2	2	Digging	EX-11038	Air	9/2/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/21/2013	385	0.013	70	1.4E-03	--	--	0	0
AD-001864	2	3	Digging	EX-11202	Air	9/8/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/24/2011	385	0.013	35	2.9E-03	0	0	0	0
AD-001864	2	3	Digging	EX-11202	Air	9/8/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/18/2013	385	0.013	68	1.5E-03	--	--	0	0
AD-001867	2	1	Digging	EX-10748	Air	8/17/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	40	2.9E-03	0	0	0	0
AD-001867	2	2	Digging	EX-10949	Air	8/27/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	35	2.9E-03	0	0	0	0
AD-001867	2	3	Digging	EX-11190	Air	9/11/2010	Field Sample	248	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/24/2011	385	0.013	40	3.0E-03	0	0	0	0
AD-002028	2	1	Digging	EX-10507	Air	8/4/2010	Field Sample	296	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	34	2.9E-03	0	0	0	0
AD-002028	2	2	Digging	EX-10926	Air	8/25/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	34	3.0E-03	0	0	0	0
AD-002028	2	3	Digging	EX-11252	Air	9/14/2010	Field Sample	284	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/25/2011	385	0.013	35	3.0E-03	0	0	0	0
AD-002156	2	1	Digging	EX-10674	Air	8/16/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	35	2.9E-03	0	0	0	0
AD-002156	2	1	Digging	EX-10674	Air	8/16/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/10/2013	385	0.013	70	1.5E-03	--	--	0	0
AD-002156	2	2	Digging	EX-10976	Air	8/26/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/7/2010	360	0.013	77	5.5E-03	0	0	0	0
AD-002156	2	2	Digging	EX-10976	Air	8/26/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	1/17/2013	1/21/2013	360	0.013	348	1.2E-03	--	--	4	4.8E-03
AD-002156	2	3	Digging	EX-11269	Air	9/15/2010	Field Sample	121	TEM-ISO	EMSL27	NOT QC	Direct	10/26/2010	1/20/2011	385	0.013	77	3.2E-03	0	0	0	0
AD-002156	2	3	Digging	EX-11269	Air	9/15/2010	Field Sample	121	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/25/2013	385	0.013	198	1.2E-03	--	--	1	1.2E-03
AD-002388	2	1	Digging	EX-10626	Air	8/10/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	53	2.0E-03	0	0	0	0
AD-002388	2	1	Digging	EX-10626	Air	8/10/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/10/2013	385	0.013	53	2.0E-03	--	--	0	0
AD-002388	2	2	Digging	EX-10988	Air	8/27/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	40	2.9E-03	0	0	0	0
AD-002388	2	2	Digging	EX-10988	Air	8/27/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/21/2013	385	0.013	81	1.4E-03	--	--	0	0
AD-002388	2	3	Digging	EX-11145	Air	9/7/2010	Field Sample	257	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/21/2011	385	0.013	39	3.0E-03	0	0	0	0
AD-002388	2	3	Digging	EX-11145	Air	9/7/2010	Field Sample	257	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/23/2013	385	0.013	77	1.5E-03	--	--	0	0
AD-002515	2	1	Digging	EX-10543	Air	8/3/2010	Field Sample	288	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/5/2010	360	0.013	77	5.0E-02	0	0	0	0
AD-002515	2	2	Digging	EX-10910	Air	8/24/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/6/2010	360	0.013	77	2.4E-02	0	0	0	0
AD-002515	2	3	Digging	EX-11207	Air	9/9/2010	Field Sample	121	TEM-ISO	EMSL27	NOT QC	Direct	10/26/2010	1/20/2011	385	0.013	77	3.2E-03	0	0	0	0
AD-002759	2	1	Digging	EX-10464	Air	7/29/2010	Field Sample	306	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/9/2010	385	0.013	36	2.7E-03	0	0	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-002759	2	1	Digging	EX-10464	Air	7/29/2010	Field Sample	306	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/10/2013	385	0.013	61	1.6E-03	--	--	0	0
AD-002759	2	2	Digging	EX-10784	Air	8/20/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	9/9/2010	9/10/2010	385	0.013	58	2.0E-03	0	0	0	0
AD-002759	2	2	Digging	EX-10784	Air	8/20/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/21/2013	385	0.013	60	1.9E-03	--	--	0	0
AD-002759	2	3	Digging	EX-11294	Air	9/15/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	10/26/2010	1/20/2011	385	0.013	77	3.0E-03	0	0	0	0
AD-002759	2	3	Digging	EX-11294	Air	9/15/2010	Field Sample	129	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/25/2013	385	0.013	154	1.5E-03	--	--	0	0
AD-003775	2	1	Digging	EX-10457	Air	7/29/2010	Field Sample	311	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/9/2010	385	0.013	35	2.7E-03	0	0	0	0
AD-003775	2	1	Digging	EX-10457	Air	7/29/2010	Field Sample	311	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/10/2013	385	0.013	62	1.5E-03	--	--	0	0
AD-003775	2	2	Digging	EX-10688	Air	8/10/2010	Field Sample	285	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/12/2010	385	0.013	35	3.0E-03	0	0	0	0
AD-003775	2	2	Digging	EX-10688	Air	8/10/2010	Field Sample	285	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/21/2013	385	0.013	70	1.5E-03	--	--	0	0
AD-003775	2	3	Digging	EX-11100	Air	8/31/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-003775	2	3	Digging	EX-11100	Air	8/31/2010	Field Sample	253	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/18/2013	385	0.013	88	1.3E-03	--	--	0	0
AD-003789	2	1	Digging	EX-10217	Air	7/26/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/7/2010	385	0.013	77	3.0E-03	0	0	0	0
AD-003789	2	1	Digging	EX-10217	Air	7/26/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/9/2013	385	0.013	153	1.5E-03	--	--	0	0
AD-003789	2	2	Digging	EX-10598	Air	8/12/2010	Field Sample	135	TEM-ISO	EMSL27	NOT QC	Direct	9/28/2010	9/28/2010	385	0.013	74	3.0E-03	0	0	0	0
AD-003789	2	2	Digging	EX-10598	Air	8/12/2010	Field Sample	135	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/18/2013	385	0.013	150	1.5E-03	--	--	0	0
AD-003789	2	3	Digging	EX-11092	Air	8/30/2010	Field Sample	246	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	31	3.9E-03	0	0	0	0
AD-003789	2	3	Digging	EX-11092	Air	8/30/2010	Field Sample	246	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/14/2013	385	0.013	90	1.3E-03	--	--	0	0
AD-005148	2	1	Digging	EX-10252	Air	7/29/2010	Field Sample	277	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	36	3.0E-03	0	0	0	0
AD-005148	2	1	Digging	EX-10252	Air	7/29/2010	Field Sample	277	TEM-ISO	EMSL27	NOT QC	Direct	1/8/2013	1/9/2013	385	0.013	72	1.5E-03	--	--	0	0
AD-005148	2	2	Digging	EX-10655	Air	8/13/2010	Field Sample	301	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	33	3.0E-03	0	0	0	0
AD-005148	2	2	Digging	EX-10655	Air	8/13/2010	Field Sample	301	TEM-ISO	EMSL27	NOT QC	Direct	1/17/2013	1/18/2013	385	0.013	70	1.4E-03	--	--	0	0
AD-005148	2	3	Digging	EX-11240	Air	9/13/2010	Field Sample	284	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/25/2011	385	0.013	35	3.0E-03	0	0	0	0
AD-005148	2	3	Digging	EX-11240	Air	9/13/2010	Field Sample	284	TEM-ISO	EMSL22	NOT QC	Direct	3/11/2013	3/20/2013	385	0.013	70	1.5E-03	--	--	0	0
AD-000065	3	1	Playing/Digging	EX-10472	Air	7/30/2010	Field Sample	311	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/2/2010	385	0.013	24	4.0E-03	0	0	0	0
AD-000065	3	2	Playing/Digging	EX-10891	Air	8/20/2010	Field Sample	305	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	25	3.9E-03	0	0	0	0
AD-000065	3	3	Playing/Digging	EX-11197	Air	9/13/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	30	4.0E-03	0	0	0	0
AD-000180	3	1	Playing/Digging	EX-10254	Air	7/30/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/1/2010	385	0.013	27	3.9E-03	0	0	0	0
AD-000180	3	2	Playing/Digging	EX-10873	Air	8/18/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	10/1/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-000180	3	3	Playing/Digging	EX-11159	Air	9/8/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-000244	3	1	Playing/Digging	EX-10243	Air	7/28/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-000244	3	2	Playing/Digging	EX-10725	Air	8/13/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	29	3.9E-03	0	0	0	0
AD-000244	3	3	Playing/Digging	EX-11182	Air	9/13/2010	Field Sample	254	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-000258	3	1	Playing/Digging	EX-10577	Air	8/9/2010	Field Sample	285	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/21/2011	385	0.013	26	4.0E-03	0	0	0	0
AD-000258	3	2	Playing/Digging	EX-10931	Air	8/26/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-000258	3	3	Playing/Digging	EX-11320	Air	9/30/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	30	4.0E-03	0	0	0	0
AD-000769	3	1	Playing/Digging	EX-10487	Air	8/2/2010	Field Sample	300	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	25	3.9E-03	0	0	0	0
AD-000769	3	2	Playing/Digging	EX-10884	Air	8/19/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/4/2010	360	0.013	77	8.4E-03	0	0	0	0
AD-000769	3	3	Playing/Digging	EX-11118	Air	9/2/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	29	3.9E-03	0	0	0	0
AD-001564	3	1	Playing/Digging	EX-10753	Air	8/17/2010	Field Sample	273	TEM-ISO	EMSL27	NOT QC	Indirect - Ashed	9/28/2010	10/4/2010	360	0.013	77	8.8E-03	0	0	0	0
AD-001564	3	2	Playing/Digging	EX-10795	Air	8/24/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	29	3.9E-03	0	0	0	0
AD-001564	3	3	Playing/Digging	EX-11289	Air	9/14/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	29	3.9E-03	0	0	0	0
AD-001587	3	1	Playing/Digging	EX-10413	Air	7/24/2010	Field Sample	319	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/3/2010	385	0.013	26	3.6E-03	0	0	0	0
AD-001587	3	2	Playing/Digging	EX-10565	Air	8/5/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-001587	3	3	Playing/Digging	EX-11125	Air	9/2/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-001727	3	1	Playing/Digging	EX-10427	Air	7/26/2010	Field Sample	301	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/7/2010	385	0.013	27	3.6E-03	0	0	0	0
AD-001727	3	2	Playing/Digging	EX-10791	Air	8/24/2010	Field Sample	261	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	29	3.9E-03	0	0	0	0
AD-001727	3	3	Playing/Digging	EX-11285	Air	9/14/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	30	4.0E-03	0	0	0	0
AD-001731	3	1	Playing/Digging	EX-10452	Air	7/28/2010	Field Sample	123	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/8/2010	385	0.013	61	3.9E-03	0	0	0	0
AD-001731	3	2	Playing/Digging	EX-10526	Air	8/2/2010	Field Sample	299	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	25	4.0E-03	0	0	0	0
AD-001731	3	3	Playing/Digging	EX-11258	Air	9/15/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-001864	3	1	Playing/Digging	EX-10862	Air	8/17/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-001864	3	2	Playing/Digging	EX-11042	Air	9/3/2010	Field Sample	280	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/21/2011	385	0.013	27	3.9E-03	0	0	0	0
AD-001864	3	3	Playing/Digging	EX-11228	Air	9/10/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	27	3.9E-03	0	0	0	0
AD-002028	3	1	Playing/Digging	EX-10509	Air	8/4/2010	Field Sample	131	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	55	4.1E-03	0	0	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-002028	3	1	Playing/Digging	EX-10510	Air	8/4/2010	Field Sample	314	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/21/2011	385	0.013	24	3.9E-03	0	0	0	0
AD-002028	3	2	Playing/Digging	EX-10920	Air	8/25/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-002028	3	3	Playing/Digging	EX-11248	Air	9/14/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-002041	3	1	Playing/Digging	EX-10206	Air	7/24/2010	Field Sample	304	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	25	3.9E-03	0	0	0	0
AD-002041	3	2	Playing/Digging	EX-10969	Air	8/25/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	29	3.9E-03	0	0	0	0
AD-002041	3	3	Playing/Digging	EX-11174	Air	9/10/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	77	1.5E-03	0	0	0	0
AD-002122	3	1	Playing/Digging	EX-10422	Air	7/26/2010	Field Sample	137	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/7/2010	385	0.013	55	3.9E-03	0	0	0	0
AD-002122	3	2	Playing/Digging	EX-10549	Air	8/4/2010	Field Sample	131	TEM-ISO	EMSL27	NOT QC	Direct	8/25/2010	9/10/2010	385	0.013	57	4.0E-03	0	0	0	0
AD-002122	3	3	Playing/Digging	EX-11004	Air	8/30/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-002388	3	1	Playing/Digging	EX-10628	Air	8/10/2010	Field Sample	303	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	33	3.0E-03	0	0	0	0
AD-002388	3	2	Playing/Digging	EX-10992	Air	8/27/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	10/1/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-002388	3	3	Playing/Digging	EX-11147	Air	9/7/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	30	4.0E-03	0	0	0	0
AD-002759	3	1	Playing/Digging	EX-10475	Air	7/30/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	27	3.9E-03	0	0	0	0
AD-002759	3	2	Playing/Digging	EX-10788	Air	8/20/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	10/1/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-002759	3	3	Playing/Digging	EX-11296	Air	9/15/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	29	3.9E-03	0	0	0	0
AD-003052	3	1	Playing/Digging	EX-10439	Air	7/27/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	10/22/2010	1/21/2011	385	0.013	26	3.9E-03	0	0	0	0
AD-003052	3	1	Playing/Digging	EX-10440	Air	7/27/2010	Field Sample	123	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/8/2010	385	0.013	63	3.8E-03	1	3.8E-03	1	3.8E-03
AD-003052	3	2	Playing/Digging	EX-10667	Air	8/16/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	34	3.0E-03	0	0	0	0
AD-003052	3	3	Playing/Digging	EX-11008	Air	8/30/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-003775	3	1	Playing/Digging	EX-10461	Air	7/29/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/9/2010	385	0.013	32	3.1E-03	4	1.3E-02	3	9.4E-03
AD-003775	3	2	Playing/Digging	EX-10692	Air	8/10/2010	Field Sample	290	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-003775	3	3	Playing/Digging	EX-11103	Air	8/31/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-003789	3	1	Playing/Digging	EX-10222	Air	7/26/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	15	7.0E-03	26	1.8E-01	11	7.6E-02
AD-003789	3	2	Playing/Digging	EX-10723	Air	8/12/2010	Field Sample	129	TEM-ISO	EMSL27	NOT QC	Direct	9/16/2010	9/22/2010	385	0.013	77	3.0E-03	7	2.1E-02	5	1.5E-02
AD-003789	3	3	Playing/Digging	EX-11096	Air	8/30/2010	Field Sample	246	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	31	3.9E-03	0	0	0	0
AD-004362	3	1	Playing/Digging	EX-10536	Air	8/3/2010	Field Sample	306	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/3/2010	385	0.013	25	3.9E-03	0	0	0	0
AD-004362	3	2	Playing/Digging	EX-10899	Air	8/23/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	27	3.9E-03	0	0	0	0
AD-004362	3	3	Playing/Digging	EX-11213	Air	9/10/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/23/2010	385	0.013	27	3.9E-03	0	0	0	0
AD-005148	3	1	Playing/Digging	EX-10247	Air	7/29/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/1/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-005703	3	1	Playing/Digging	EX-10663	Air	8/13/2010	Field Sample	284	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	35	3.0E-03	0	0	0	0
AD-005703	3	2	Playing/Digging	EX-10799	Air	8/24/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	9/10/2010	9/11/2010	385	0.013	30	3.9E-03	0	0	0	0
AD-005703	3	3	Playing/Digging	EX-11054	Air	9/3/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	26	3.9E-03	0	0	0	0
AD-OU4NA	4	1	Driving	EX-10013	Air	7/10/2010	Field Sample	1384	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	22	9.7E-04	0	0	0	0
AD-OU4NA	4	1	Driving	EX-10013	Air	7/10/2010	Field Sample	1384	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/23/2013	385	0.013	43	5.0E-04	--	--	0	0
AD-OU4NA	4	2	Driving	EX-10017	Air	7/10/2010	Field Sample	1415	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	21	1.0E-03	0	0	0	0
AD-OU4NA	4	2	Driving	EX-10017	Air	7/10/2010	Field Sample	1415	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/23/2013	385	0.013	43	4.9E-04	--	--	0	0
AD-OU4NA	4	3	Driving	EX-10022	Air	7/12/2010	Field Sample	1435	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	21	9.8E-04	0	0	0	0
AD-OU4NA	4	3	Driving	EX-10022	Air	7/12/2010	Field Sample	1435	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/23/2013	385	0.013	42	4.9E-04	--	--	0	0
AD-OU4NA	4	4	Driving	EX-10026	Air	7/12/2010	Field Sample	1457	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	21	9.7E-04	0	0	0	0
AD-OU4NA	4	4	Driving	EX-10026	Air	7/12/2010	Field Sample	1457	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/24/2013	385	0.013	41	5.0E-04	--	--	0	0
AD-OU4NA	4	5	Driving	EX-10031	Air	7/12/2010	Field Sample	1444	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	21	9.8E-04	0	0	0	0
AD-OU4NA	4	5	Driving	EX-10031	Air	7/12/2010	Field Sample	1444	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/24/2013	385	0.013	42	4.9E-04	--	--	0	0
AD-OU4NA	4	6	Driving	EX-10038	Air	7/13/2010	Field Sample	1399	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	22	9.6E-04	0	0	0	0
AD-OU4NA	4	6	Driving	EX-10038	Air	7/13/2010	Field Sample	1399	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/24/2013	385	0.013	43	4.9E-04	--	--	0	0
AD-OU4NA	4	7	Driving	EX-10043	Air	7/13/2010	Field Sample	1405	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	22	9.6E-04	0	0	0	0
AD-OU4NA	4	7	Driving	EX-10043	Air	7/13/2010	Field Sample	1405	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/24/2013	385	0.013	43	4.9E-04	--	--	0	0
AD-OU4NA	4	8	Driving	EX-10047	Air	7/13/2010	Field Sample	1378	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	22	9.8E-04	0	0	0	0
AD-OU4NA	4	8	Driving	EX-10047	Air	7/13/2010	Field Sample	1378	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/24/2013	385	0.013	44	4.9E-04	--	--	0	0
AD-OU4NA	4	9	Driving	EX-10051	Air	7/14/2010	Field Sample	1281	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	24	9.6E-04	0	0	0	0
AD-OU4NA	4	10	Driving	EX-10056	Air	7/14/2010	Field Sample	1364	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	22	9.9E-04	0	0	0	0
AD-OU4NA	4	10	Driving	EX-10056	Air	7/14/2010	Field Sample	1364	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/25/2013	385	0.013	44	4.9E-04	--	--	0	0
AD-OU4NA	4	11	Driving	EX-10060	Air	7/14/2010	Field Sample	1395	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	22	9.6E-04	0	0	0	0
AD-OU4NA	4	11	Driving	EX-10060	Air	7/14/2010	Field Sample	1395	TEM-ISO	EMSL22	NOT QC	Direct	1/22/2013	1/25/2013	385	0.013	43	4.9E-04	--	--	0	0
AD-OU4NA	4	12	Driving	EX-10181	Air	7/15/2010	Field Sample	1322	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	23	9.7E-04	0	0	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-OU4NA	4	13	Driving	EX-10183	Air	7/15/2010	Field Sample	1322	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	23	9.7E-04	0	0	0	0
AD-OU4NA	4	14	Driving	EX-10185	Air	7/15/2010	Field Sample	1346	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	23	9.6E-04	0	0	0	0
AD-OU4NA	4	15	Driving	EX-10189	Air	7/16/2010	Field Sample	1277	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	24	9.7E-04	0	0	0	0
AD-OU4NA	4	16	Driving	EX-10191	Air	7/16/2010	Field Sample	1287	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	24	9.6E-04	0	0	0	0
AD-OU4NA	4	17	Driving	EX-10193	Air	7/16/2010	Field Sample	1312	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	23	9.8E-04	0	0	0	0
AD-OU4NA	4	18	Driving	EX-10196	Air	7/17/2010	Field Sample	1322	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	23	9.7E-04	0	0	0	0
AD-OU4NA	4	19	Driving	EX-10198	Air	7/17/2010	Field Sample	1322	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	23	9.7E-04	0	0	0	0
AD-OU4NA	4	20	Driving	EX-10200	Air	7/17/2010	Field Sample	1291	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/31/2010	385	0.013	23	1.0E-03	0	0	0	0
AD-OU4NA	5	1	Biking, Sector A (Rider)	EX-10106	Air	7/14/2010	Field Sample	287	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	21	4.9E-03	0	0	0	0
AD-OU4NA	5	1	Biking, Sector A (Rider)	EX-10106	Air	7/14/2010	Field Sample	287	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/15/2013	385	0.013	26	4.0E-03	--	--	0	0
AD-OU4NA	5	1	Biking, Sector A (Rider)	EX-10108	Air	7/14/2010	Field Sample	292	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	21	4.8E-03	0	0	0	0
AD-OU4NA	5	1	Biking, Sector A (Rider)	EX-10108	Air	7/14/2010	Field Sample	292	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/15/2013	385	0.013	25	4.1E-03	--	--	0	0
AD-OU4NA	5	1	Biking, Sector A (Trailer)	EX-10262	Air	7/14/2010	Field Sample	384	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	8	9.6E-03	0	0	0	0
AD-000680	5	1	Biking, Sector B (Rider)	EX-10093	Air	7/13/2010	Field Sample	287	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	11	9.4E-03	0	0	0	0
AD-000680	5	1	Biking, Sector B (Rider)	EX-10093	Air	7/13/2010	Field Sample	287	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	36	2.9E-03	--	--	0	0
AD-OU4NA	5	1	Biking, Sector B (Rider)	EX-10094	Air	7/13/2010	Field Sample	294	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	21	4.8E-03	0	0	0	0
AD-OU4NA	5	1	Biking, Sector B (Rider)	EX-10094	Air	7/13/2010	Field Sample	294	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	25	4.0E-03	--	--	0	0
AD-OU4NA	5	1	Biking, Sector B (Trailer)	EX-10098	Air	7/13/2010	Field Sample	352	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	17	4.9E-03	0	0	0	0
AD-OU4NA	5	1	Biking, Sector C (Rider)	EX-10287	Air	7/16/2010	Field Sample	267	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	23	4.8E-03	0	0	0	0
AD-OU4NA	5	1	Biking, Sector C (Rider)	EX-10287	Air	7/16/2010	Field Sample	267	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	2.8E-03	--	--	0	0
AD-OU4NA	5	1	Biking, Sector C (Rider)	EX-10288	Air	7/16/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	23	5.0E-03	0	0	0	0
AD-OU4NA	5	1	Biking, Sector C (Rider)	EX-10288	Air	7/16/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	2.9E-03	--	--	0	0
AD-OU4NA	5	1	Biking, Sector C (Trailer)	EX-10300	Air	7/16/2010	Field Sample	246	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	13	9.3E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector A (Rider)	EX-10115	Air	7/14/2010	Field Sample	278	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	21	5.1E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector A (Rider)	EX-10115	Air	7/14/2010	Field Sample	278	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/15/2013	385	0.013	28	3.8E-03	--	--	0	0
AD-OU4NA	5	2	Biking, Sector A (Rider)	EX-10116	Air	7/14/2010	Field Sample	276	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	22	4.9E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector A (Rider)	EX-10116	Air	7/14/2010	Field Sample	276	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/15/2013	385	0.013	27	4.0E-03	--	--	0	0
AD-OU4NA	5	2	Biking, Sector A (Trailer)	EX-10117	Air	7/14/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	11	9.3E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector B (Rider)	EX-10096	Air	7/13/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	21	4.9E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector B (Rider)	EX-10096	Air	7/13/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	26	3.9E-03	--	--	0	0
AD-OU4NA	5	2	Biking, Sector B (Rider)	EX-10099	Air	7/13/2010	Field Sample	274	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	22	4.9E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector B (Rider)	EX-10099	Air	7/13/2010	Field Sample	274	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	28	3.9E-03	--	--	0	0
AD-OU4NA	5	2	Biking, Sector B (Trailer)	EX-10088	Air	7/13/2010	Field Sample	382	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	8	9.7E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector C (Rider)	EX-10291	Air	7/16/2010	Field Sample	278	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	22	4.8E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector C (Rider)	EX-10291	Air	7/16/2010	Field Sample	278	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	2.7E-03	--	--	0	0
AD-OU4NA	5	2	Biking, Sector C (Rider)	EX-10292	Air	7/16/2010	Field Sample	250	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	24	4.9E-03	0	0	0	0
AD-OU4NA	5	2	Biking, Sector C (Rider)	EX-10292	Air	7/16/2010	Field Sample	250	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	3.0E-03	--	--	0	0
AD-OU4NA	5	2	Biking, Sector C (Trailer)	EX-10293	Air	7/16/2010	Field Sample	257	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	12	9.6E-03	0	0	0	0
AD-OU4NA	5	3	Biking, Sector A (Rider)	EX-10263	Air	7/14/2010	Field Sample	371	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	8	1.0E-02	0	0	0	0
AD-OU4NA	5	3	Biking, Sector A (Rider)	EX-10263	Air	7/14/2010	Field Sample	371	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/16/2013	385	0.013	29	2.8E-03	--	--	0	0
AD-OU4NA	5	3	Biking, Sector A (Rider)	EX-10264	Air	7/14/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	22	4.8E-03	0	0	0	0
AD-OU4NA	5	3	Biking, Sector A (Rider)	EX-10264	Air	7/14/2010	Field Sample	280	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/17/2013	385	0.013	26	4.1E-03	--	--	0	0
AD-OU4NA	5	3	Biking, Sector A (Trailer)	EX-10105	Air	7/14/2010	Field Sample	352	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	9	9.3E-03	0	0	0	0
AD-OU4NA	5	3	Biking, Sector B (Rider)	EX-10265	Air	7/15/2010	Field Sample	289	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	21	4.9E-03	0	0	0	0
AD-OU4NA	5	3	Biking, Sector B (Rider)	EX-10265	Air	7/15/2010	Field Sample	289	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	26	3.9E-03	--	--	0	0
AD-OU4NA	5	3	Biking, Sector B (Rider)	EX-10266	Air	7/15/2010	Field Sample	265	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	23	4.9E-03	0	0	0	0
AD-OU4NA	5	3	Biking, Sector B (Rider)	EX-10266	Air	7/15/2010	Field Sample	265	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	30	3.7E-03	--	--	0	0
AD-OU4NA	5	3	Biking, Sector B (Trailer)	EX-10267	Air	7/15/2010	Field Sample	372	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	8	1.0E-02	0	0	0	0
AD-OU4NA	5	3	Biking, Sector C (Rider)	EX-10301	Air	7/16/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	24	5.0E-03	0	0	0	0
AD-OU4NA	5	3	Biking, Sector C (Rider)	EX-10301	Air	7/16/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	3.0E-03	--	--	0	0
AD-OU4NA	5	3	Biking, Sector C (Rider)	EX-10304	Air	7/16/2010	Field Sample	321	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	11	8.4E-03	0	0	0	0
AD-OU4NA	5	3	Biking, Sector C (Rider)	EX-10304	Air	7/16/2010	Field Sample	321	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	2.3E-03	--	--	0	0
AD-OU4NA	5	3	Biking, Sector C (Trailer)	EX-10289	Air	7/16/2010	Field Sample	265	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	12	9.3E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector A (Rider)	EX-10305	Air	7/17/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	14	8.4E-03	0	0	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-OU4NA	5	4	Biking, Sector A (Rider)	EX-10305	Air	7/17/2010	Field Sample	253	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/17/2013	385	0.013	40	2.9E-03	--	--	0	0
AD-OU4NA	5	4	Biking, Sector A (Rider)	EX-10307	Air	7/17/2010	Field Sample	276	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	24	4.5E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector A (Rider)	EX-10307	Air	7/17/2010	Field Sample	276	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/17/2013	385	0.013	25	4.3E-03	--	--	0	0
AD-OU4NA	5	4	Biking, Sector A (Trailer)	EX-10318	Air	7/17/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	14	8.0E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector B (Rider)	EX-10275	Air	7/15/2010	Field Sample	278	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	22	4.8E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector B (Rider)	EX-10275	Air	7/15/2010	Field Sample	278	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	27	3.9E-03	--	--	0	0
AD-OU4NA	5	4	Biking, Sector B (Rider)	EX-10276	Air	7/15/2010	Field Sample	295	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	21	4.8E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector B (Rider)	EX-10276	Air	7/15/2010	Field Sample	295	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/19/2013	385	0.013	25	4.0E-03	--	--	0	0
AD-OU4NA	5	4	Biking, Sector B (Trailer)	EX-10282	Air	7/15/2010	Field Sample	384	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	8	9.6E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector C (Rider)	EX-10324	Air	7/19/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	24	4.4E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector C (Rider)	EX-10324	Air	7/19/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	2.6E-03	--	--	0	0
AD-OU4NA	5	4	Biking, Sector C (Rider)	EX-10325	Air	7/19/2010	Field Sample	246	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	27	4.5E-03	0	0	0	0
AD-OU4NA	5	4	Biking, Sector C (Rider)	EX-10325	Air	7/19/2010	Field Sample	246	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	3.0E-03	--	--	0	0
AD-OU4NA	5	4	Biking, Sector C (Trailer)	EX-10329	Air	7/19/2010	Field Sample	274	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	13	8.3E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector A (Rider)	EX-10311	Air	7/17/2010	Field Sample	257	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	15	7.7E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector A (Rider)	EX-10311	Air	7/17/2010	Field Sample	257	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/17/2013	385	0.013	38	3.0E-03	--	--	0	0
AD-OU4NA	5	5	Biking, Sector A (Rider)	EX-10312	Air	7/17/2010	Field Sample	235	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	29	4.3E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector A (Rider)	EX-10312	Air	7/17/2010	Field Sample	235	TEM-ISO	EMSL22	NOT QC	Direct	1/15/2013	1/23/2013	385	0.013	28	4.5E-03	--	--	0	0
AD-OU4NA	5	5	Biking, Sector A (Trailer)	EX-10306	Air	7/17/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	14	8.4E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector B (Rider)	EX-10280	Air	7/15/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	23	4.9E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector B (Rider)	EX-10280	Air	7/15/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	2/12/2013	2/21/2013	385	0.013	29	3.9E-03	--	--	0	0
AD-OU4NA	5	5	Biking, Sector B (Rider)	EX-10281	Air	7/15/2010	Field Sample	283	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	21	5.0E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector B (Rider)	EX-10281	Air	7/15/2010	Field Sample	283	TEM-ISO	EMSL22	NOT QC	Direct	2/12/2013	2/21/2013	385	0.013	27	3.9E-03	--	--	0	0
AD-OU4NA	5	5	Biking, Sector B (Trailer)	EX-10277	Air	7/15/2010	Field Sample	276	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/23/2010	385	0.013	11	9.8E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector C (Rider)	EX-10327	Air	7/19/2010	Field Sample	237	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	27	4.6E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector C (Rider)	EX-10327	Air	7/19/2010	Field Sample	237	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	40	3.1E-03	--	--	0	0
AD-OU4NA	5	5	Biking, Sector C (Rider)	EX-10328	Air	7/19/2010	Field Sample	274	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	24	4.5E-03	0	0	0	0
AD-OU4NA	5	5	Biking, Sector C (Rider)	EX-10328	Air	7/19/2010	Field Sample	274	TEM-ISO	EMSL27	NOT QC	Direct	1/14/2013	1/14/2013	385	0.013	38	2.8E-03	--	--	0	0
AD-OU4NA	5	5	Biking, Sector C (Trailer)	EX-10333	Air	7/19/2010	Field Sample	276	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	14	7.7E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector A (Rider)	EX-10316	Air	7/17/2010	Field Sample	298	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	42	2.4E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector A (Rider)	EX-10317	Air	7/17/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	25	4.5E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector A (Trailer)	EX-10313	Air	7/17/2010	Field Sample	255	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	14	8.3E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector B (Rider)	EX-10338	Air	7/20/2010	Field Sample	248	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	24	5.0E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector B (Rider)	EX-10339	Air	7/20/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	23	4.9E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector B (Trailer)	EX-10349	Air	7/20/2010	Field Sample	267	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	12	9.2E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector C (Rider)	EX-10332	Air	7/19/2010	Field Sample	271	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	24	4.6E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector C (Rider)	EX-10334	Air	7/19/2010	Field Sample	257	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	24	4.8E-03	0	0	0	0
AD-OU4NA	5	6	Biking, Sector C (Trailer)	EX-10323	Air	7/19/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	14	8.4E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector A (Rider)	EX-10375	Air	7/22/2010	Field Sample	261	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	24	4.7E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector A (Rider)	EX-10376	Air	7/22/2010	Field Sample	271	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	25	4.4E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector A (Trailer)	EX-10387	Air	7/22/2010	Field Sample	270	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	13	8.4E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector B (Rider)	EX-10345	Air	7/20/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	23	4.9E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector B (Rider)	EX-10346	Air	7/20/2010	Field Sample	283	TEM-ISO	EMSL27	NOT QC	Direct	11/18/2010	11/22/2010	385	0.013	21	5.0E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector B (Trailer)	EX-10343	Air	7/20/2010	Field Sample	267	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	12	9.2E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector C (Rider)	EX-10353	Air	7/21/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	23	4.9E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector C (Rider)	EX-10355	Air	7/21/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	24	4.9E-03	0	0	0	0
AD-OU4NA	5	7	Biking, Sector C (Trailer)	EX-10364	Air	7/21/2010	Field Sample	276	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	11	9.8E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector A (Rider)	EX-10381	Air	7/22/2010	Field Sample	257	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	25	4.6E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector A (Rider)	EX-10383	Air	7/22/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	25	4.5E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector A (Trailer)	EX-10380	Air	7/22/2010	Field Sample	280	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	13	8.1E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector B (Rider)	EX-10348	Air	7/20/2010	Field Sample	287	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	21	4.9E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector B (Rider)	EX-10350	Air	7/20/2010	Field Sample	285	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	21	4.9E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector B (Trailer)	EX-10337	Air	7/20/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	12	9.4E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector C (Rider)	EX-10359	Air	7/21/2010	Field Sample	257	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	24	4.8E-03	0	0	0	0

ATTACHMENT 1B. Detailed Results of Air Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

ABS Information				Sample Information					Analysis Information										Results			
Property ID	Scenario	Event	Activity	Sample ID	Matrix	Sample Date	Sample Type	Volume Collected (L)	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	Sensitivity $(cc)^{-1}$	N LA Structures Total	LA Air Conc. (s/cc) Total	N LA Structures PCME	LA Air Conc. (s/cc) PCME
AD-OU4NA	5	8	Biking, Sector C (Rider)	EX-10361	Air	7/21/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	23	5.0E-03	0	0	0	0
AD-OU4NA	5	8	Biking, Sector C (Trailer)	EX-10369	Air	7/21/2010	Field Sample	271	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	12	9.1E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector A (Rider)	EX-10385	Air	7/22/2010	Field Sample	253	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	25	4.7E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector A (Rider)	EX-10386	Air	7/22/2010	Field Sample	270	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	25	4.4E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector A (Trailer)	EX-10390	Air	7/23/2010	Field Sample	276	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	13	8.3E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector B (Rider)	EX-10397	Air	7/23/2010	Field Sample	276	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	25	4.3E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector B (Rider)	EX-10398	Air	7/23/2010	Field Sample	319	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	21	4.4E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector B (Rider)	EX-10400	Air	7/23/2010	Field Sample	125	TEM-ISO	EMSL27	NOT QC	Direct	9/29/2010	9/30/2010	385	0.013	48	4.9E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector B (Trailer)	EX-10402	Air	7/23/2010	Field Sample	261	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	14	8.1E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector C (Rider)	EX-10365	Air	7/21/2010	Field Sample	270	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	22	5.0E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector C (Rider)	EX-10366	Air	7/21/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	23	4.9E-03	0	0	0	0
AD-OU4NA	5	9	Biking, Sector C (Trailer)	EX-10360	Air	7/21/2010	Field Sample	250	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	12	9.9E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector A (Rider)	EX-10391	Air	7/23/2010	Field Sample	257	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	25	4.6E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector A (Rider)	EX-10392	Air	7/23/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	25	4.6E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector A (Trailer)	EX-10374	Air	7/22/2010	Field Sample	267	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	25	4.4E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector B (Rider)	EX-10403	Air	7/23/2010	Field Sample	259	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	25	4.6E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector B (Rider)	EX-10404	Air	7/23/2010	Field Sample	255	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/3/2010	385	0.013	25	4.6E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector B (Trailer)	EX-10396	Air	7/23/2010	Field Sample	232	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/25/2010	385	0.013	28	4.6E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector C (Rider)	EX-10370	Air	7/21/2010	Field Sample	278	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	24	4.4E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector C (Rider)	EX-10371	Air	7/21/2010	Field Sample	271	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	13	8.4E-03	0	0	0	0
AD-OU4NA	5	10	Biking, Sector C (Trailer)	EX-10354	Air	7/21/2010	Field Sample	263	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	12	9.4E-03	0	0	0	0

Notes:
ABS - activity-based sampling
ID - identification
QC - quality control
EFA - effective filter area
L - liter
mm - millimeter
GO - grid opening
N - number of asbestos structures
LA - Libby amphibole
Conc. - concentration
TEM - transmission electron microscopy
s/cc - structures per cubic centimeter
PCME - phase contrast microscopy-equivalent
-- analysis was performed at low magnification; only PCME structures were recorded

This page intentionally left blank to facilitate double-sided printing.

ATTACHMENT 1C. Detailed Results of Air Field Quality Control Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Sample ID	Matrix	Sample Date	Sample Type	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	N LA Structures Total
AD-000025	EX-10611	Air	8/9/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-000025	EX-11306	Air	9/16/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-000146	EX-10074	Air	7/10/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/2/2010	385	0.013	10	0
AD-000146	EX-10234	Air	7/27/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	10	0
AD-000180	EX-10256	Air	7/30/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	9/2/2010	385	0.013	10	0
AD-000180	EX-11154	Air	9/8/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-000244	EX-10087	Air	7/12/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	10	0
AD-000244	EX-10727	Air	8/13/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-000258	EX-11318	Air	9/30/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-000444	EX-10214	Air	7/26/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	10	0
AD-000553	EX-10558	Air	8/4/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-000553	EX-10717	Air	8/23/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-000785	EX-10774	Air	8/19/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-001616	EX-10226	Air	7/27/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	10	0
AD-001628	EX-10230	Air	7/27/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/24/2010	385	0.013	10	0
AD-001727	EX-11283	Air	9/14/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-001732	EX-10637	Air	8/11/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-001732	EX-11052	Air	9/3/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-001853	EX-10007	Air	7/9/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	10	0
AD-001853	EX-10738	Air	8/16/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-001864	EX-10861	Air	8/17/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-001865	EX-10080	Air	7/12/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	10	0
AD-001865	EX-10492	Air	8/2/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-001865	EX-10963	Air	8/25/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-002032	EX-10997	Air	8/28/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-002041	EX-10208	Air	7/24/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	10	0
AD-002564	EX-10650	Air	8/12/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/21/2010	385	0.013	10	0
AD-002632	EX-11222	Air	9/10/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-003789	EX-10220	Air	7/26/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/19/2010	385	0.013	10	0
AD-003789	EX-11094	Air	8/30/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-003995	EX-11068	Air	9/7/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	10/10/2010	10/25/2010	385	0.013	10	0
AD-OU4NA	EX-10012	Air	7/10/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/24/2010	385	0.013	10	0

ATTACHMENT 1C. Detailed Results of Air Field Quality Control Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Sample ID	Matrix	Sample Date	Sample Type	Analysis Method	Laboratory	Lab QC Type	Prep Method	Prep Date	Analysis Date	EFA (mm^2)	GO Size (mm^2)	GOs Counted	N LA Structures Total
AD-OU4NA	EX-10021	Air	7/12/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	10	0
AD-OU4NA	EX-10039	Air	7/13/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/25/2010	385	0.013	10	0
AD-OU4NA	EX-10092	Air	7/13/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/19/2010	8/20/2010	385	0.013	10	0
AD-OU4NA	EX-10052	Air	7/14/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/30/2010	385	0.013	10	0
AD-OU4NA	EX-10290	Air	7/16/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/23/2010	8/26/2010	385	0.013	10	0
AD-OU4NA	EX-10310	Air	7/17/2010	Field Blank	TEM-ISO	EMSL27	NOT QC	Direct	8/24/2010	9/2/2010	385	0.013	10	0

Notes:

ABS - activity-based sampling

ID - identification

QC - quality control

EFA - effective filter area

mm - millimeter

GO - grid opening

N - number of asbestos structures

LA - Libby amphibole

TEM - transmission electron microscopy

ATTACHMENT 1D. Detailed Results of Soil Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Scenario	Event	Sample ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
									None	Low	Medium	High						
AD-000025	1	Pre	EX-10001	Soil	6/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	7/12/2010	Tr	B1
AD-000025	1	1	EX-10608	Soil	8/9/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000025	1	2	EX-10983	Soil	8/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/30/2010	Tr	B1
AD-000025	1	3	EX-11307	Soil	9/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-000065	1	1	EX-10467	Soil	7/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-000065	1	2	EX-10894	Soil	8/20/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	ND	A
AD-000065	1	3	EX-11193	Soil	9/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/22/2010	ND	A
AD-000065	3	1	EX-10471	Soil	7/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-000065	3	2	EX-10890	Soil	8/20/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	ND	A
AD-000065	3	3	EX-11196	Soil	9/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000117	2	1	EX-10630	Soil	8/11/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000117	2	2	EX-10940	Soil	8/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-000117	2	3	EX-11045	Soil	9/3/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/6/2010	ND	A
AD-000126	2	Pre	EX-10162	Soil	7/12/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	7/29/2010	ND	A
AD-000126	2	1	EX-10579	Soil	8/9/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000126	2	2	EX-10972	Soil	8/26/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-000126	2	3	EX-11223	Soil	9/10/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000146	1	1	EX-10069	Soil	7/10/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	EMSL27	NOT QC	7/27/2010	ND	A
AD-000146	1	2	EX-10235	Soil	7/27/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-000146	1	3	EX-10567	Soil	8/5/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-000180	1	1	EX-10260	Soil	7/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-000180	1	2	EX-10868	Soil	8/18/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000180	1	3	EX-11155	Soil	9/8/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000180	3	1	EX-10257	Soil	7/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-000180	3	2	EX-10869	Soil	8/18/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	ND	A
AD-000180	3	3	EX-11158	Soil	9/8/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000244	1	1	EX-10082	Soil	7/12/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	EMSL22	NOT QC	7/29/2010	ND	A
AD-000244	1	2	EX-10728	Soil	8/13/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000244	1	3	EX-11184	Soil	9/10/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/22/2010	ND	A
AD-000244	3	1	EX-10246	Soil	7/28/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/18/2010	ND	A
AD-000244	3	2	EX-10724	Soil	8/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000244	3	3	EX-11181	Soil	9/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/22/2010	ND	A
AD-000258	1	Pre	EX-10165	Soil	7/21/2010	Field Sample	Yes	30	2	28	0	0	PLM-VE	ESATR8	NOT QC	8/2/2010	Tr	B1
AD-000258	1	1	EX-10520	Soil	8/7/2010	Field Sample	Yes	30	20	10	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000258	1	2	EX-10937	Soil	8/26/2010	Field Sample	Yes	30	24	6	0	0	PLM-VE	EMSL22	NOT QC	9/28/2010	ND	A
AD-000258	1	3	EX-11314	Soil	9/27/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-000258	2	1	EX-10571	Soil	8/9/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000258	2	2	EX-10934	Soil	8/26/2010	Field Sample	Yes	30	17	6	7	0	PLM-VE	EMSL22	NOT QC	9/28/2010	Tr	B1
AD-000258	2	3	EX-11311	Soil	9/27/2010	Field Sample	Yes	30	15	9	6	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-000258	3	1	EX-10576	Soil	8/9/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000258	3	2	EX-10930	Soil	8/26/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	EMSL22	NOT QC	9/28/2010	ND	A

ATTACHMENT 1D. Detailed Results of Soil Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Scenario	Event	Sample ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
									None	Low	Medium	High						
AD-000258	3	3	EX-11319	Soil	9/30/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	10/22/2010	ND	A
AD-000262	1	Pre	EX-10166	Soil	7/21/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/2/2010	Tr	B1
AD-000262	1	1	EX-10731	Soil	8/13/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000262	1	2	EX-10904	Soil	8/23/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	Tr	B1
AD-000262	1	3	EX-11069	Soil	9/8/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-000293	1	1	EX-10407	Soil	7/24/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-000293	1	2	EX-10886	Soil	8/20/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	Tr	B1
AD-000293	1	3	EX-11280	Soil	9/16/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000381	1	Pre	EX-10168	Soil	7/22/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/2/2010	Tr	B1
AD-000381	1	1	EX-10642	Soil	8/12/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-000381	1	2	EX-11019	Soil	8/31/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/1/2010	Tr	B1
AD-000381	1	3	EX-11236	Soil	9/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-000381	2	1	EX-10643	Soil	8/12/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-000381	2	2	EX-11015	Soil	8/31/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/1/2010	Tr	B1
AD-000381	2	3	EX-11232	Soil	9/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/25/2010	Tr	B1
AD-000415	1	Pre	EX-10171	Soil	7/22/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	8/2/2010	<1	B2
AD-000415	1	1	EX-10612	Soil	8/9/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000415	1	2	EX-11030	Soil	9/2/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/5/2010	ND	A
AD-000415	1	3	EX-11303	Soil	9/16/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-000415	2	1	EX-10613	Soil	8/9/2010	Field Sample	Yes	30	17	13	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000415	2	2	EX-11026	Soil	9/2/2010	Field Sample	Yes	30	18	12	0	0	PLM-VE	ESATR8	NOT QC	10/5/2010	ND	A
AD-000415	2	3	EX-11300	Soil	9/16/2010	Field Sample	Yes	30	17	13	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-000444	1	1	EX-10213	Soil	7/26/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/17/2010	ND	A
AD-000444	1	2	EX-10497	Soil	8/3/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-000444	1	3	EX-11110	Soil	9/2/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000553	2	1	EX-10555	Soil	8/4/2010	Field Sample	Yes	30	0	30	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-000553	2	2	EX-10714	Soil	8/23/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	Tr	B1
AD-000553	2	3	EX-11243	Soil	9/13/2010	Field Sample	Yes	30	21	9	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-000769	1	1	EX-10478	Soil	8/2/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000769	1	2	EX-10879	Soil	8/19/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-000769	1	3	EX-11114	Soil	9/2/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000769	3	1	EX-10482	Soil	8/2/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-000769	3	2	EX-10880	Soil	8/19/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-000769	3	3	EX-11117	Soil	9/2/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000785	1	Pre	EX-10511	Soil	8/5/2010	Field Sample	Yes	30	6	20	4	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-000785	1	1	EX-10594	Soil	8/11/2010	Field Sample	Yes	30	13	10	7	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-000785	1	2	EX-10775	Soil	8/19/2010	Field Sample	Yes	30	17	6	7	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000785	1	3	EX-11078	Soil	9/8/2010	Field Sample	Yes	30	15	12	3	0	PLM-VE	ESATR8	NOT QC	10/21/2010	Tr	B1
AD-000785	2	1	EX-10512	Soil	8/5/2010	Field Sample	Yes	30	18	12	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-000785	2	2	EX-10771	Soil	8/19/2010	Field Sample	Yes	30	14	16	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-000785	2	3	EX-11074	Soil	9/8/2010	Field Sample	Yes	30	16	14	0	0	PLM-VE	ESATR8	NOT QC	10/21/2010	ND	A

ATTACHMENT 1D. Detailed Results of Soil Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Scenario	Event	Sample ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
									None	Low	Medium	High						
AD-000933	1	1	EX-10551	Soil	8/4/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-000933	1	2	EX-10710	Soil	8/23/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	ND	A
AD-000933	1	3	EX-11166	Soil	9/9/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/21/2010	ND	A
AD-001511	1	1	EX-10240	Soil	7/28/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	ESATR8	NOT QC	8/18/2010	ND	A
AD-001511	1	2	EX-10587	Soil	8/11/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	ND	A
AD-001511	1	3	EX-11135	Soil	9/3/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001511	2	1	EX-10239	Soil	7/28/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/18/2010	Tr	B1
AD-001511	2	2	EX-10583	Soil	8/11/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	ND	A
AD-001511	2	3	EX-11132	Soil	9/3/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001564	3	1	EX-10751	Soil	8/17/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	Tr	B1
AD-001564	3	2	EX-10794	Soil	8/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	ND	A
AD-001564	3	3	EX-11288	Soil	9/14/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-001587	1	1	EX-10417	Soil	7/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-001587	1	2	EX-10559	Soil	8/5/2010	Field Sample	Yes	30	23	7	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-001587	1	3	EX-11123	Soil	9/2/2010	Field Sample	Yes	30	23	7	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001587	3	1	EX-10416	Soil	7/24/2010	Field Sample	Yes	30	24	6	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-001587	3	2	EX-10564	Soil	8/5/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-001587	3	3	EX-11124	Soil	9/2/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001616	1	1	EX-10227	Soil	7/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/17/2010	ND	A
AD-001616	1	2	EX-10590	Soil	8/11/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-001616	1	3	EX-11200	Soil	9/13/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	ESATR8	NOT QC	10/25/2010	ND	A
AD-001628	1	1	EX-10231	Soil	7/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-001628	1	2	EX-10979	Soil	8/26/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-001628	1	3	EX-11272	Soil	9/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-001631	1	1	EX-10516	Soil	8/5/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-001631	1	2	EX-10743	Soil	8/17/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-001631	1	3	EX-10951	Soil	8/28/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-001644	2	1	EX-10763	Soil	8/18/2010	Field Sample	Yes	30	12	18	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001644	2	2	EX-11082	Soil	8/28/2010	Field Sample	Yes	30	1	29	0	0	PLM-VE	ESATR8	NOT QC	10/6/2010	Tr	B1
AD-001644	2	3	EX-11162	Soil	9/8/2010	Field Sample	Yes	30	16	14	0	0	PLM-VE	ESATR8	NOT QC	10/21/2010	Tr	B1
AD-001727	3	1	EX-10426	Soil	7/26/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-001727	3	2	EX-10790	Soil	8/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	ND	A
AD-001727	3	3	EX-11284	Soil	9/14/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-001731	1	Pre	EX-10062	Soil	6/25/2010	Field Sample	Yes	30	17	13	0	0	PLM-VE	ESATR8	NOT QC	7/12/2010	Tr	B1
AD-001731	1	Pre	EX-10063	Soil	6/25/2010	Field Sample	Yes	30	10	16	2	2	PLM-VE	ESATR8	NOT QC	7/12/2010	Tr	B1
AD-001731	1	1	EX-10453	Soil	7/28/2010	Field Sample	Yes	30	14	16	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-001731	1	2	EX-10529	Soil	8/2/2010	Field Sample	Yes	30	13	16	1	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-001731	1	3	EX-11261	Soil	9/15/2010	Field Sample	Yes	30	14	16	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	<1	B2
AD-001731	2	1	EX-10445	Soil	7/28/2010	Field Sample	Yes	30	3	27	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-001731	2	2	EX-10532	Soil	8/2/2010	Field Sample	Yes	30	3	27	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-001731	2	3	EX-11264	Soil	9/15/2010	Field Sample	Yes	30	11	19	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1

ATTACHMENT 1D. Detailed Results of Soil Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Scenario	Event	Sample ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
									None	Low	Medium	High						
AD-001731	3	1	EX-10450	Soil	7/28/2010	Field Sample	Yes	30	18	12	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-001731	3	2	EX-10525	Soil	8/2/2010	Field Sample	Yes	30	22	8	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-001731	3	3	EX-11257	Soil	9/15/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-001732	1	1	EX-10430	Soil	7/26/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-001732	1	2	EX-10634	Soil	8/11/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-001732	1	3	EX-11049	Soil	9/3/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/6/2010	ND	A
AD-001815	1	1	EX-11106	Soil	8/31/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001815	1	2	EX-11150	Soil	9/8/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001815	1	3	EX-11276	Soil	9/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-001853	1	1	EX-10006	Soil	7/9/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL27	NOT QC	7/27/2010	ND	A
AD-001853	1	2	EX-10524	Soil	7/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-001853	1	3	EX-10735	Soil	8/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	ND	A
AD-001864	2	1	EX-10678	Soil	8/17/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001864	2	2	EX-11037	Soil	9/2/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/5/2010	ND	A
AD-001864	2	3	EX-11201	Soil	9/8/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/25/2010	ND	A
AD-001864	3	1	EX-10677	Soil	8/17/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001864	3	2	EX-11041	Soil	9/3/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/5/2010	ND	A
AD-001864	3	3	EX-11227	Soil	9/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-001865	1	1	EX-10075	Soil	7/12/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	7/29/2010	ND	A
AD-001865	1	2	EX-10489	Soil	8/2/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-001865	1	3	EX-10719	Soil	8/25/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	ND	A
AD-001867	1	Pre	EX-10066	Soil	6/29/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	7/20/2010	Tr	B1
AD-001867	1	1	EX-10493	Soil	8/3/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-001867	1	2	EX-10695	Soil	8/12/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001867	1	3	EX-10944	Soil	8/27/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-001867	2	1	EX-10747	Soil	8/17/2010	Field Sample	Yes	30	8	22	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001867	2	2	EX-10948	Soil	8/27/2010	Field Sample	Yes	30	20	10	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-001867	2	3	EX-11189	Soil	9/11/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/22/2010	ND	A
AD-001868	1	Pre	EX-10065	Soil	6/29/2010	Field Sample	Yes	30	23	6	1	0	PLM-VE	ESATR8	NOT QC	7/15/2010	Tr	B1
AD-001868	1	1	EX-10539	Soil	8/3/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-001868	1	2	EX-10864	Soil	8/17/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-001868	1	3	EX-11128	Soil	9/3/2010	Field Sample	Yes	30	27	2	1	0	PLM-VE	ESATR8	NOT QC	10/18/2010	<1	B2
AD-001991	1	1	EX-10759	Soil	8/18/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-001991	1	2	EX-10998	Soil	8/28/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-001991	1	3	EX-11057	Soil	9/7/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-002028	1	Pre	EX-10061	Soil	6/24/2010	Field Sample	Yes	30	20	10	0	0	PLM-VE	ESATR8	NOT QC	7/12/2010	Tr	B1
AD-002028	1	1	EX-10501	Soil	8/4/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-002028	1	2	EX-10923	Soil	8/25/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	EMSL22	NOT QC	9/28/2010	Tr	B1
AD-002028	1	3	EX-11254	Soil	9/14/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-002028	2	1	EX-10504	Soil	8/4/2010	Field Sample	Yes	30	12	18	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	2	C
AD-002028	2	2	EX-10925	Soil	8/25/2010	Field Sample	Yes	30	19	9	2	0	PLM-VE	EMSL22	NOT QC	9/28/2010	<1	B2

ATTACHMENT 1D. Detailed Results of Soil Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Scenario	Event	Sample ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
									None	Low	Medium	High						
AD-002028	2	3	EX-11251	Soil	9/14/2010	Field Sample	Yes	30	17	13	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	<1	B2
AD-002028	3	1	EX-10505	Soil	8/4/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-002028	3	2	EX-10919	Soil	8/25/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	EMSL22	NOT QC	9/28/2010	ND	A
AD-002028	3	3	EX-11247	Soil	9/14/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-002032	1	1	EX-10755	Soil	8/18/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-002032	1	2	EX-10994	Soil	8/28/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-002032	1	3	EX-11061	Soil	9/7/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	Tr	B1
AD-002041	1	1	EX-10207	Soil	7/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/17/2010	ND	A
AD-002041	1	2	EX-10964	Soil	8/25/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	ND	A
AD-002041	1	3	EX-11170	Soil	9/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/21/2010	ND	A
AD-002041	3	1	EX-10202	Soil	7/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/17/2010	ND	A
AD-002041	3	2	EX-10968	Soil	8/25/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	ND	A
AD-002041	3	3	EX-11173	Soil	9/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/21/2010	ND	A
AD-002066	1	Pre	EX-10161	Soil	7/12/2010	Field Sample	Yes	30	24	6	0	0	PLM-VE	EMSL22	NOT QC	7/29/2010	ND	A
AD-002122	3	1	EX-10420	Soil	7/26/2010	Field Sample	Yes	30	27	3	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-002122	3	2	EX-10547	Soil	8/4/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-002122	3	3	EX-11003	Soil	8/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/1/2010	ND	A
AD-002156	1	Pre	EX-10681	Soil	8/7/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL27	NOT QC	8/16/2010	ND	A
AD-002156	2	1	EX-10673	Soil	8/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-002156	2	2	EX-10975	Soil	8/26/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-002156	2	3	EX-11267	Soil	9/15/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-002170	1	Pre	EX-10003	Soil	6/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	7/15/2010	ND	A
AD-002195	1	Pre	EX-10163	Soil	7/12/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	EMSL22	NOT QC	7/29/2010	ND	A
AD-002388	2	1	EX-10623	Soil	8/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-002388	2	2	EX-10987	Soil	8/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-002388	2	3	EX-11143	Soil	9/7/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-002388	3	1	EX-10624	Soil	8/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-002388	3	2	EX-10991	Soil	8/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-002388	3	3	EX-11144	Soil	9/7/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-002501	1	Pre	EX-10004	Soil	7/1/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	7/20/2010	Tr	B1
AD-002501	1	1	EX-10441	Soil	7/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/18/2010	Tr	B1
AD-002501	1	2	EX-10683	Soil	8/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-002501	1	3	EX-11404	Soil	9/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-002515	1	Pre	EX-10170	Soil	7/22/2010	Field Sample	Yes	30	20	6	4	0	PLM-VE	ESATR8	NOT QC	8/2/2010	Tr	B1
AD-002515	1	1	EX-10604	Soil	8/7/2010	Field Sample	Yes	30	20	10	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-002515	1	2	EX-10909	Soil	8/24/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	ND	A
AD-002515	1	3	EX-11209	Soil	9/9/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/25/2010	Tr	B1
AD-002515	2	1	EX-10542	Soil	8/3/2010	Field Sample	Yes	30	0	23	7	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-002515	2	2	EX-10908	Soil	8/24/2010	Field Sample	Yes	30	9	21	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	Tr	B1
AD-002515	2	3	EX-11205	Soil	9/9/2010	Field Sample	Yes	30	14	11	5	0	PLM-VE	ESATR8	NOT QC	10/25/2010	Tr	B1
AD-002564	1	Pre	EX-10701	Soil	8/9/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL27	NOT QC	8/16/2010	ND	A

ATTACHMENT 1D. Detailed Results of Soil Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Scenario	Event	Sample ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
									None	Low	Medium	High						
AD-002564	1	Pre	EX-10702	Soil	8/9/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL27	NOT QC	8/16/2010	ND	A
AD-002564	1	1	EX-10649	Soil	8/12/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-002564	1	2	EX-10767	Soil	8/19/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	Tr	B1
AD-002564	1	3	EX-11033	Soil	9/2/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/5/2010	ND	A
AD-002632	1	Pre	EX-10682	Soil	8/7/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	EMSL27	NOT QC	8/16/2010	ND	A
AD-002632	1	1	EX-10706	Soil	8/23/2010	Field Sample	Yes	30	17	13	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	Tr	B1
AD-002632	1	2	EX-11022	Soil	9/2/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	10/5/2010	Tr	B1
AD-002632	1	3	EX-11219	Soil	9/10/2010	Field Sample	Yes	30	24	6	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-002697	1	Pre	EX-10657	Soil	8/13/2010	Field Sample	Yes	30	16	14	0	0	PLM-VE	ESATR8	NOT QC	8/26/2010	<1	B2
AD-002697	1	1	EX-10658	Soil	8/13/2010	Field Sample	Yes	30	18	12	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-002697	1	2	EX-10779	Soil	8/20/2010	Field Sample	Yes	30	11	19	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-002697	1	3	EX-11086	Soil	8/30/2010	Field Sample	Yes	30	6	24	0	0	PLM-VE	ESATR8	NOT QC	10/6/2010	ND	A
AD-002759	2	1	EX-10463	Soil	7/29/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-002759	2	2	EX-10783	Soil	8/20/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-002759	2	3	EX-11292	Soil	9/15/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-002759	3	1	EX-10474	Soil	7/30/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-002759	3	2	EX-10787	Soil	8/20/2010	Field Sample	Yes	30	26	4	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-002759	3	3	EX-11295	Soil	9/15/2010	Field Sample	Yes	30	29	1	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-002990	1	Pre	EX-10705	Soil	8/11/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	8/23/2010	ND	A
AD-002990	1	1	EX-10739	Soil	8/16/2010	Field Sample	Yes	30	18	12	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-002990	1	2	EX-10955	Soil	8/28/2010	Field Sample	Yes	30	23	7	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-002990	1	3	EX-11177	Soil	9/10/2010	Field Sample	Yes	30	21	6	3	0	PLM-VE	ESATR8	NOT QC	10/22/2010	<1	B2
AD-003052	1	Pre	EX-10002	Soil	6/28/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	7/15/2010	Tr	B1
AD-003052	1	1	EX-10434	Soil	7/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-003052	1	2	EX-10666	Soil	8/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-003052	1	3	EX-11011	Soil	8/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/1/2010	Tr	B1
AD-003052	3	1	EX-10438	Soil	7/27/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-003052	3	2	EX-10670	Soil	8/16/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	Tr	B1
AD-003052	3	3	EX-11007	Soil	8/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/1/2010	ND	A
AD-003226	1	Pre	EX-10164	Soil	7/14/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	EMSL27	NOT QC	7/26/2010	ND	A
AD-003226	1	1	EX-10875	Soil	8/19/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-003226	1	2	EX-10959	Soil	8/28/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/29/2010	ND	A
AD-003226	1	3	EX-11139	Soil	9/7/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	Tr	B1
AD-003324	1	Pre	EX-10064	Soil	6/25/2010	Field Sample	Yes	30	1	5	20	4	PLM-VE	ESATR8	NOT QC	7/12/2010	Tr	B1
AD-003775	2	1	EX-10456	Soil	7/29/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-003775	2	2	EX-10687	Soil	8/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-003775	2	3	EX-11099	Soil	8/31/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-003775	3	1	EX-10460	Soil	7/29/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-003775	3	2	EX-10691	Soil	8/10/2010	Field Sample	Yes	30	20	10	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-003775	3	3	EX-11102	Soil	8/31/2010	Field Sample	Yes	30	28	2	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	<1	B2
AD-003789	2	1	EX-10215	Soil	7/26/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/17/2010	ND	A

ATTACHMENT 1D. Detailed Results of Soil Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Scenario	Event	Sample ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
									None	Low	Medium	High						
AD-003789	2	2	EX-10699	Soil	8/12/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	ND	A
AD-003789	2	3	EX-11090	Soil	8/30/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/6/2010	ND	A
AD-003789	3	1	EX-10221	Soil	7/26/2010	Field Sample	Yes	30	19	11	0	0	PLM-VE	EMSL22	NOT QC	8/17/2010	Tr	B1
AD-003789	3	2	EX-10721	Soil	8/12/2010	Field Sample	Yes	30	25	5	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	<1	B2
AD-003789	3	3	EX-11095	Soil	8/30/2010	Field Sample	Yes	30	3	26	1	0	PLM-VE	ESATR8	NOT QC	10/18/2010	1	C
AD-003995	1	Pre	EX-10703	Soil	8/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL27	NOT QC	8/16/2010	ND	A
AD-003995	1	1	EX-10638	Soil	8/11/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-003995	1	2	EX-10915	Soil	8/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	Tr	B1
AD-003995	1	3	EX-11065	Soil	9/7/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/18/2010	Tr	B1
AD-004362	1	Pre	EX-10167	Soil	7/21/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/2/2010	Tr	B1
AD-004362	1	1	EX-10619	Soil	8/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-004362	1	2	EX-10898	Soil	8/23/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	ND	A
AD-004362	1	3	EX-11216	Soil	9/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-004362	3	1	EX-10535	Soil	8/3/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	ND	A
AD-004362	3	2	EX-10897	Soil	8/23/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/29/2010	ND	A
AD-004362	3	3	EX-11212	Soil	9/10/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/25/2010	Tr	B1
AD-005148	2	1	EX-10251	Soil	7/29/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-005148	2	2	EX-10653	Soil	8/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	Tr	B1
AD-005148	2	3	EX-11239	Soil	9/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	Tr	B1
AD-005148	3	1	EX-10250	Soil	7/29/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	8/18/2010	ND	A
AD-005703	3	1	EX-10662	Soil	8/13/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/15/2010	ND	A
AD-005703	3	2	EX-10798	Soil	8/24/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	ND	A
AD-005703	3	3	EX-11053	Soil	9/3/2010	Field Sample	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/6/2010	Tr	B1

Notes:

ABS - activity-based sampling

Pre - sample collected during pre-screening activity

ID - identification

QC - quality control

LA - Libby amphibole

Conc. - concentration

ND - not detected (Bin A)

Tr - trace (Bin B1)

<1% - less than 1% (Bin B2)

PLM-VE - polarized light microscopy-visual area estimation

This page intentionally left blank to facilitate double-sided printing.

ATTACHMENT 1E. Detailed Results of Soil Field Quality Control Samples Collected During the 2010 Residential Activity-Based Sampling Investigation

Property ID	Sample ID	Sample Parent ID	Matrix	Sample Date	Sample Type	Composite (Y/N)	Aliquot	Visible Vermiculite				Analysis Method	Lab ID	Lab QC Type	Analysis Date	LA Conc. (%)	LA Bin
								None	Low	Medium	High						
AD-000381	EX-10169	EX-10168	Soil	7/22/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/2/2010	Tr	B1
AD-001731	EX-10449	EX-10445	Soil	7/28/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	8/19/2010	Tr	B1
AD-001587	EX-10560	EX-10559	Soil	8/5/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	ND	A
AD-000258	EX-10572	EX-10571	Soil	8/9/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-003775	EX-10694	EX-10687	Soil	8/10/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	Hygeia	NOT QC	8/27/2010	ND	A
AD-001865	EX-10720	EX-10719	Soil	8/25/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	9/28/2010	ND	A
AD-002028	EX-10924	EX-10923	Soil	8/25/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	EMSL22	NOT QC	9/28/2010	Tr	B1
AD-003052	EX-11012	EX-11011	Soil	8/30/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/1/2010	ND	A
AD-000262	EX-11073	EX-11069	Soil	9/8/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/21/2010	ND	A
AD-003789	EX-11091	EX-11090	Soil	8/30/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/6/2010	ND	A
AD-001815	EX-11153	EX-11150	Soil	9/8/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/21/2010	ND	A
AD-002156	EX-11271	EX-11267	Soil	9/15/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1
AD-002759	EX-11298	EX-11292	Soil	9/15/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/19/2010	ND	A
AD-000258	EX-11317	EX-11314	Soil	9/27/2010	Field Duplicate	Yes	30	30	0	0	0	PLM-VE	ESATR8	NOT QC	10/20/2010	Tr	B1

Notes:

ABS - activity-based sampling

ID - identification

QC - quality control

LA - Libby amphibole

Conc. - concentration

ND - not detected (Bin A)

Tr - trace (Bin B1)

<1% - less than 1% (Bin B2)

PLM-VE - polarized light microscopy-visual area estimation

This page intentionally left blank to facilitate double-sided printing.